PB89-128409

Superfund Record of Decision (EPA Region 10)
Frontier Hard Chrome, Washington
December 1987. First Remedial Action

(U.S.) Environmental Protection Agency
Washington, DC

30 Dec 87

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE

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Frontier Hard Chrome, WA
First Remedial Action

5. Report Date 12/30/87

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401 M Street, S.W.
Washington, D.C. 20460

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800/000

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15. Supplementary Notes

and ordered to halt to

16. Abstract (Limit: 200 words)

The Frontier Hard Chrome (FHC) site covering approximately one-half acre, is located in the City of Vancouver, Washington. Underlying ground water is used as the drinking water supply for the City of Vancouver. Two well fields are within one mile of the FHC site. The site has primarily been occupied by two businesses engaged in the chrome plating industry. Pioneer Plating operated at the site from 1958 to 1970. The site was then occupied by FHC until 1983. During Pioneer's operation and FHC's initial operation, chromium plating wastes were discharged [illegible] the sanitary sewer system. In 1975, the City of Vancouver determined that chromium in FHC's waste water was upsetting the operation of its new secondary treatment system. FHC was directed by Vancouver and the Washington Department of Ecology (Ecology) to cease discharge to the sewer system until a treatment system was installed to remove chromium from their waste. At that time, FHC began discharge of their untreated plating wastes to a drywell behind the facility. In 1976, FHC was given a waste water disposal permit for discharge to the drywell by Ecology. The permit also contained a schedule for completion of a treatment system for their wastes. In 1982, Ecology found FHC in violation of the Dangerous Waste Act for the illegal disposal for hazardous wastes. In 1983, Ecology ordered FHC to stop discharge of chromium plating wastes to the drywell. Ecology discovered chromium in the
(See Attached Sheet)

was found

17. Document Analysis a. Descriptors
Record of Decision
Frontier Hard Chrome, WA
First Remedial Action
Contaminated Media: soil
Key Contaminants: chromium

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

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(Formerly NTIS–35)
Department of Commerce

PB89-128409

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R10-88/012
December 1987

EPA

Superfund Record of Decision:

Frontier Hard Chrome, WA

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U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

16. ABSTRACT (continued)

ground water at more than twice the drinking water standards, and in soil and FHC building structures.

are delineated.

The selected remedial action for this site includes: excavation of 7,400 yd^3 of chromium contaminated soils exceeding 550 mg/kg with onsite treatment using chemical stabilization followed by onsite disposal of treatment residuals and placement of a final site cover; and demolition of the FHC building. The estimated present worth cost for this remedial action is $2,000,000.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
SEATTLE, WASHINGTON 98101

DEC 23 1987

REPLY TO ATTN OF: HW-113

MEMORANDUM

SUBJECT: Record of Decision
Frontier Hard Chrome

FROM: Charles E. Findley, Director
Hazardous Waste Division
C. F

TO: Robie G. Russell
Regional Administrator

Attached is the Record of Decision (ROD) for the Frontier Hard Chrome Superfund site in Vancouver, Washington. The authority to sign this ROD was delegated to the Regional Administrator on November 12, 1987.

Frontier Hard Chrome is a now-defunct chrome plating facility. During a portion of their operations from 1970 to 1983, chrome plating waste was disposed of into a dry well, causing contamination of the groundwater and soil on and near the site.

This ROD is for the source control/soils operable unit of the remedial action. The proposal is for the stabilization of chromium in the soils, placement back on site, and final capping. The groundwater operable unit ROD will be developed when the final groundwater remedial action is decided.

A briefing on Frontier Hard Chrome is scheduled for December 23 at 10:00.

Attachment

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE

Frontier Hard Chrome
Clark County
Vancouver, Washington

PURPOSE

This decision document presents the selected remedy for the soils/source control operable unit for this site. The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA),42 U.S.C. Section 9601 et seq. and to the extent practicable, the National Contingency Plan, 40 CFR Part 300.

BASIS FOR DECISION

This decision is based upon the Administrative Record for the site. The record contains, but is not limited to, the following documents. The documents describe the site, the actions taken at the site by the United States and the State of Washington, the evaluation of remedial alternatives for the site and the concerns of the affected community:

Remedial Investigation Report for Frontier Hard Chrome, Volumes 1 and 2, August,1987
Feasibility Study Report for Frontier Hard Chrome, Volumes 1 and 2, October, 1987

Summary of Remedial Alternative Selection

Community Relations Responsiveness Summary

Staff summaries and briefing documents

A complete list of documents contained in the Administrative Record is included in this Record of Decision.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision addresses an operable unit of the Frontier Hard Chrome site. The operable unit is the control chromium contaminated soils and structures at the site. This operable unit does not address the remediation of contaminated groundwater. This will be addressed by a separate decision document.

The remedy selected consists of the chemical stabilization of chromium contaminated soils at the Frontier Hard Chrome site. This treatment alternative will reduce the mobility and toxicity of the contamination at the site and will prevent further contamination of the groundwater. This alternative will protect public health by preventing the direct contact between the public and the contamination found at the site.

Specific aspects of the remedy include: the excavation of chromium contaminated soils; on site treatment of the excavated materials by chemical stabilization; and replacement of the treated materials. Implementation of the action will require demolition of the building on the site. A final cover will be placed over the site to further prevent leaching of chromium from the soils and to control surface water run-off from precipitation.

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate and is cost effective. This remedy satisfies the preference for treatment that reduces toxicity and mobility as a principal element. It is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the extent possible.

The State of Washington was consulted and has concurred in the selected remedy.

12-31-87
Date

Robie G. Russell
Regional Administrator
Environmental Protection Agency
Region 10

SUMMARY OF REMEDIAL ALTERNATIVES

Site Description

The Frontier Hard Chrome (FHC) site is located in the southwestern part of the State of Washington, in the City of Vancouver, Washington. FHC is in an industrial area of the city directly across the Columbia River from the City of Portland, Oregon. (See Figure 1)

The site is approximately one half mile from the Columbia River and covers about one half acre. The area is within the floodplain and has been extensively filled. The groundwater table is within twenty feet of the ground surface and is affected by the stage height of the river. The groundwater is used as the drinking water supply for the City of Vancouver which has two well fields within one mile of the site. (See Figure 2,3)

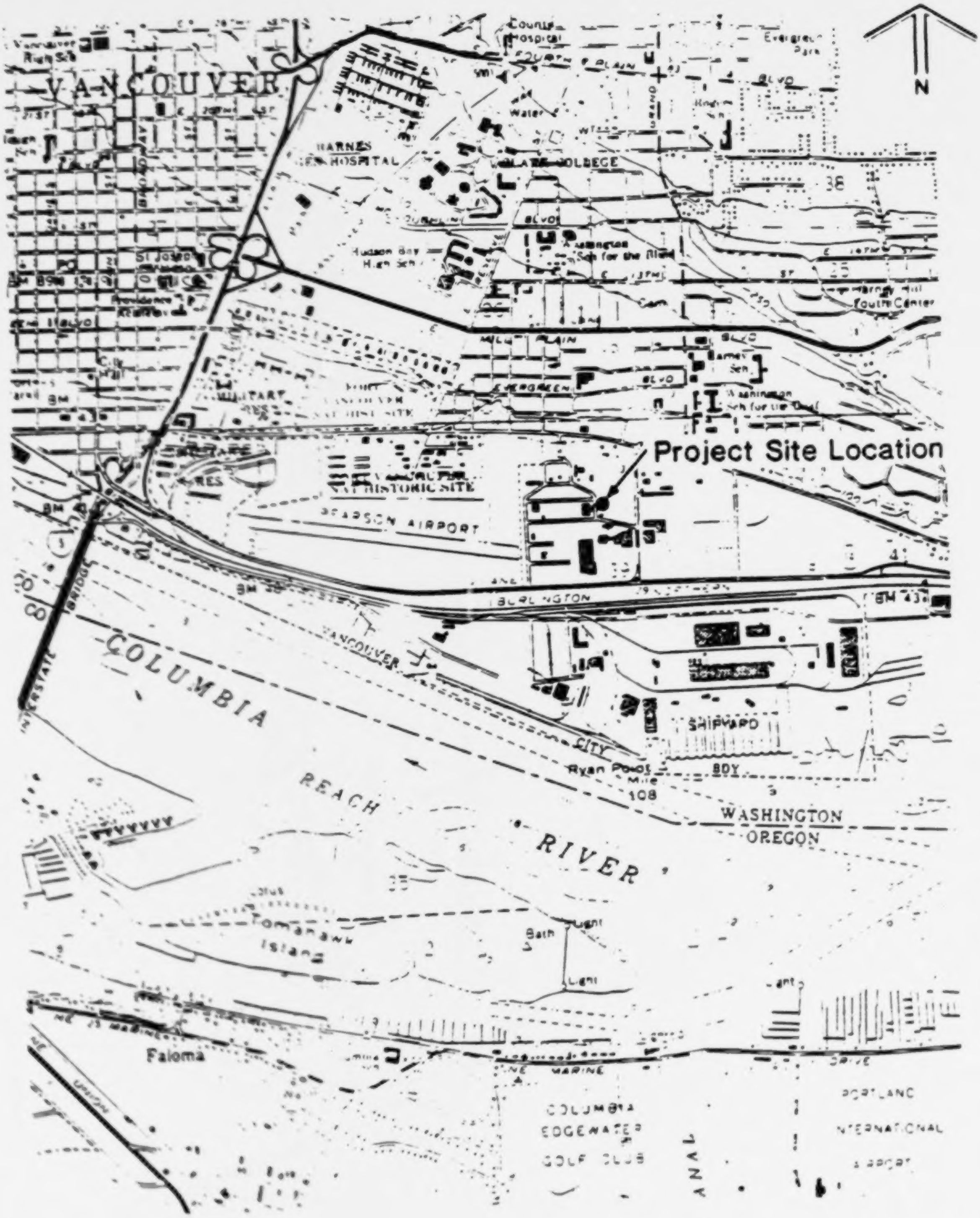
Site History

In approximately 1955, the site was filled with hydraulic dredge material and construction rubble. The site has been primarily occupied by two businesses, both engaged in the chrome plating business. Pioneer Plating operated at the site from 1958 to 1970. The site was then occupied by FHC until 1983. The property has been leased to various other businesses since 1983.

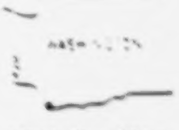
During the operation of Pioneer and the initial operation of FHC, chromium plating wastes were discharged to the sanitary sewer system. In 1975, the City of Vancouver determined that the chromium in the wastewater from FHC was upsetting the operation of its new secondary treatment system. FHC was directed by the City and the Washington Department of Ecology (Ecology) to cease discharge to the sewer system until a treatment system was installed to remove chromium from their waste. At that time, FHC began discharge of their untreated plating wastes to a drywell behind the facility.

FHC was given a wastewater disposal permit for discharge to the drywell in 1976 by Ecology. The permit also contained a schedule for the installation of a treatment system for their wastes. Between 1976 and 1981, several extensions of the permit and schedule were granted as the deadlines were passed without compliance.

In 1982, Ecology found FHC in violation of the Dangerous Waste Act for the illegal disposal of hazardous wastes. Ecology also discovered that the groundwater in the area was contaminated with chromium at more than twice the drinking water standard. FHC's wastewater permit was again modified with a new compliance date. FHC again did not comply with the permit requirements for economic reasons and in December, 1982, the FHC site was propo

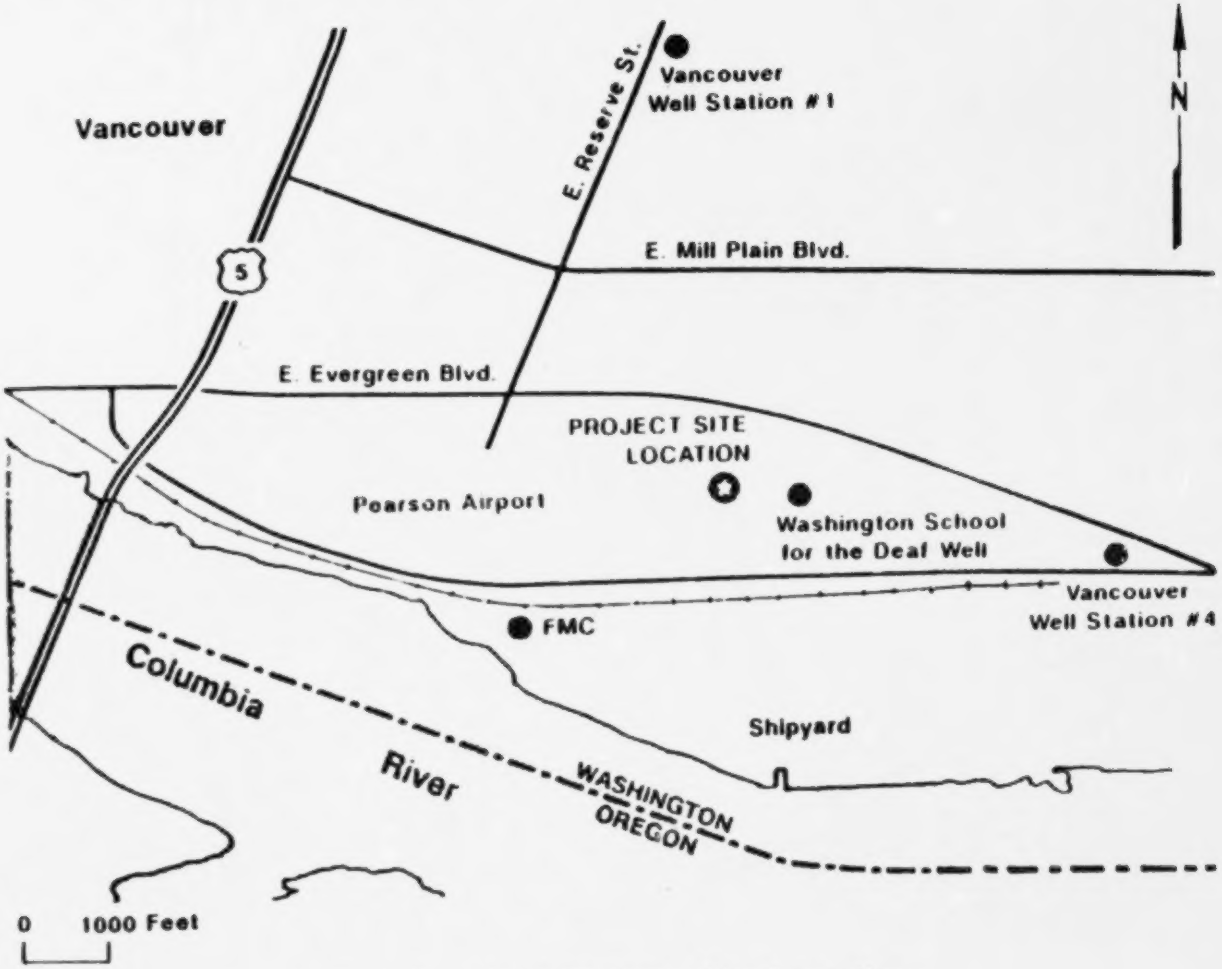

N
VANCOUVER
County Hospital
Fourth Plain Blvd
Evergreen Park
Barnes Hospital
Clark College
Hudson Bay High Sch
Washington Sch for the Blind
St Joseph
Providence
City Hall
Mill Plain Blvd
Evergreen Blvd
Washington Sch for the Deaf
Fort Vancouver Nat Hist Site
Military
Project Site Location
Pearson Airport
Burlington Northern
BM 43
Vancouver
Interstate Bridge
Columbia River
Reach
City
Shipyard
Ryan Point
Mile 108
Washington
Oregon
Tomahawk Island
Bath
Light
Faloma
NE Marine Drive
Columbia Edgewater Golf Club
Portland International Airport
Canal

Approx. Scale: 1" - 2000'


WASHINGTON

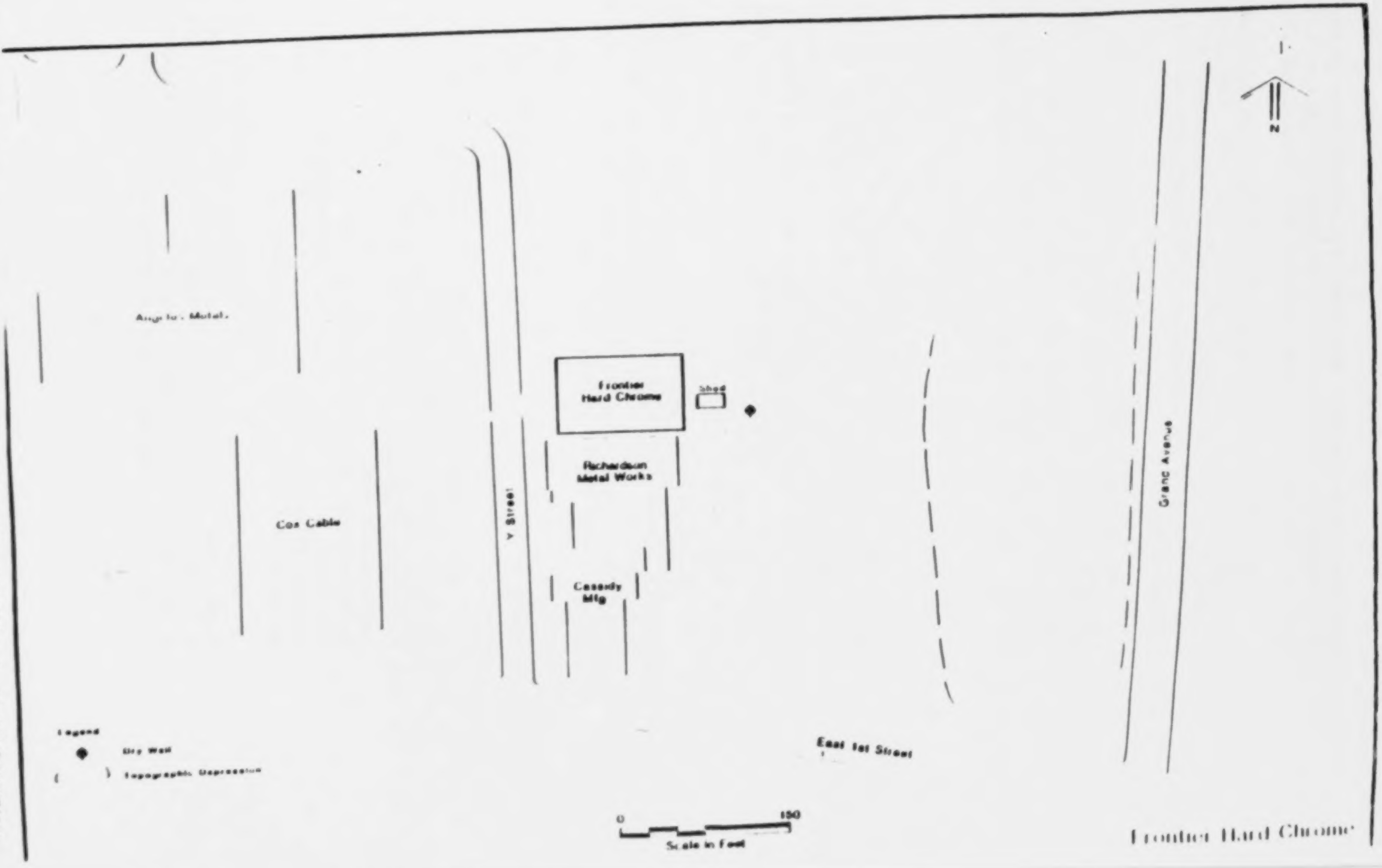
Vicinity Map

Location Ma
Frontier Hard Chrom


N
Vancouver
Vancouver
Well Station # 1
E. Reserve St.
5
E. Mill Plain Blvd.
E. Evergreen Blvd.
PROJECT SITE
LOCATION
Pearson Airport
Washington School
for the Deaf Well
Vancouver
Well Station # 4
FMC
Columbia
River
Shipyard
WASHINGTON
OREGON
0
1000 Feet

Frontier Hard Chrome Site Location

FIGURE 2


N
Grand Avenue
East 1st Street
Frontier Hard Chrome
Shed
Richardson Metal Works
Cassidy Mfg
V Street
Angelo's Metals
Cox Cable
Legend
Dry Well
Topographic Depression
0
150
Scale in Feet

Frontier Hard Chrome

for inclusion on the National Priority List under the Comprehensive Environmental Response, Compensation and Liability Act, or Superfund. The listing was finalized in September, 1983.

In 1983, Ecology ordered FHC to stop discharge of chromium plating wastes to the drywell. FHC was also required to prepare a plan for the investigation of the groundwater. FHC closed down all operations at the site. The company has not undertaken the investigation.

In March, 1983, the EPA and Ecology signed a Cooperative Agreement which gave the Ecology the lead in investigating the FHC site under Superfund. Ecology began that investigation in Fall, 1984. The Remedial Investigation (RI) led to a Feasibility Study to determine the cost effective remedial action for the FHC site. The Feasibility Study (FS) was completed in October, 1987.

Enforcement History

The regulatory and enforcement actions at the FHC site have centered around the owners and operators of FHC, Walter Neth and Otto Neth. The Neths purchased the property in 1955 and operated a chrome plating business there. Under Superfund, they are responsible parties and liable for the cleanup of the site. Past negotiations between the responsible parties, EPA and Ecology have not been productive. Since 1976, FHC has not complied fully with any agency orders.

Pioneer Plating, another operator of the facility, is another potentially responsible party. The company went out of business in 1974. No further information is available on Pioneer Plating. Current operators of the facility may also be potentially responsible parties.

Remedial Investigation

The Remedial Investigation (RI) process was begun in the Fall of 1984. At that time Ecology selected a contractor to perform the investigation. The actual fieldwork for the investigation was started about one year later. The delay in initiating the RI resulted from difficulties in project funding, contracting, and obtaining access to the site. The RI primarily involved the installation of groundwater wells to establish the extent of contamination in the aquifer and borings on site to determine the levels of chromium in the soil.

The initial results of the RI determined that there were high concentrations of chromium in the groundwater beneath the site more than 2000 times the drinking water standard of 0.05 parts per million (ppm). The RI further determined that the chromium had spread well beyond the boundaries of the site to southwest. There are several drinking water wells in the vicinity of FHC, including wells used by the City of Vancouver. However, the investigation found that these city drinking water wells were not affected by the contamination from the FHC site. The RI confirmed that the wells were also not within the direction of groundwater flow and likely would not become contaminated. The surface and sub-surface soil of the site was also found to be contaminated with elevated levels of chromium.

In mid-1986, it was determined that additional work was necessary to fully characterize the site. The additional work was needed because the aquifer beneath the facility was much more complicated than anticipated. The initial investigation found that the groundwater beneath the facility existed in two zones labeled A and B, but that there was some hydraulic connection between the two.

The initial RI also found that contamination from organic solvents was present at the site but that their source could not be determined from the existing information. The source appeared to be independent of the chromium source.

Phase 2 of the investigation was begun in January 1987. The work consisted primarily of additional groundwater monitoring wells and comprehensive surface soil sampling of the FHC site.

The investigation was completed in the summer of 1987. It confirmed that the groundwater in the two zones beneath the facility was contaminated. The upper "A" zone is a sand and gravel layer about twenty feet below surface elevation. It is about ten to fifteen feet thick and sits upon a confining layer of clay. The clay is about 35 feet below ground at the site and is not continuous throughout the area. The clay layer is generally less than five feet in thickness. Hydraulic connection exists between the "A" and "B" zones but there are no distinct vertical gradients. The drywell does not penetrate deeply into the "A" aquifer or reach the clay. The "B" layer extends below the clay to a depth of about 80 to 100 feet. (See Figure 4)

The upper "A" has higher concentrations of chromium contamination than the "B" especially in the area of the drywell where the contamination was introduced into the groundwater. The level of chromium in the "A" layer groundwater exceeded 10 ppm, total chromium. Approximately 90% of the chromium in the groundwater was found to be hexavalent chromium. The contamination in the "A" had spread off site. Movement of the groundwater in the "A" is approximately 0.5 feet per day to the south-southwest. (See Figure 5)

The "B" is also made up of sands and gravel and was found to be more permeable than the upper aquifer. The groundwater velocity in this layer is approximately 2.25 feet per day to the south-southwest. The contamination of the "B" extends much further than in the "A" and has reached the Columbia River. The levels of chromium were less in the "B" aquifer. The highest

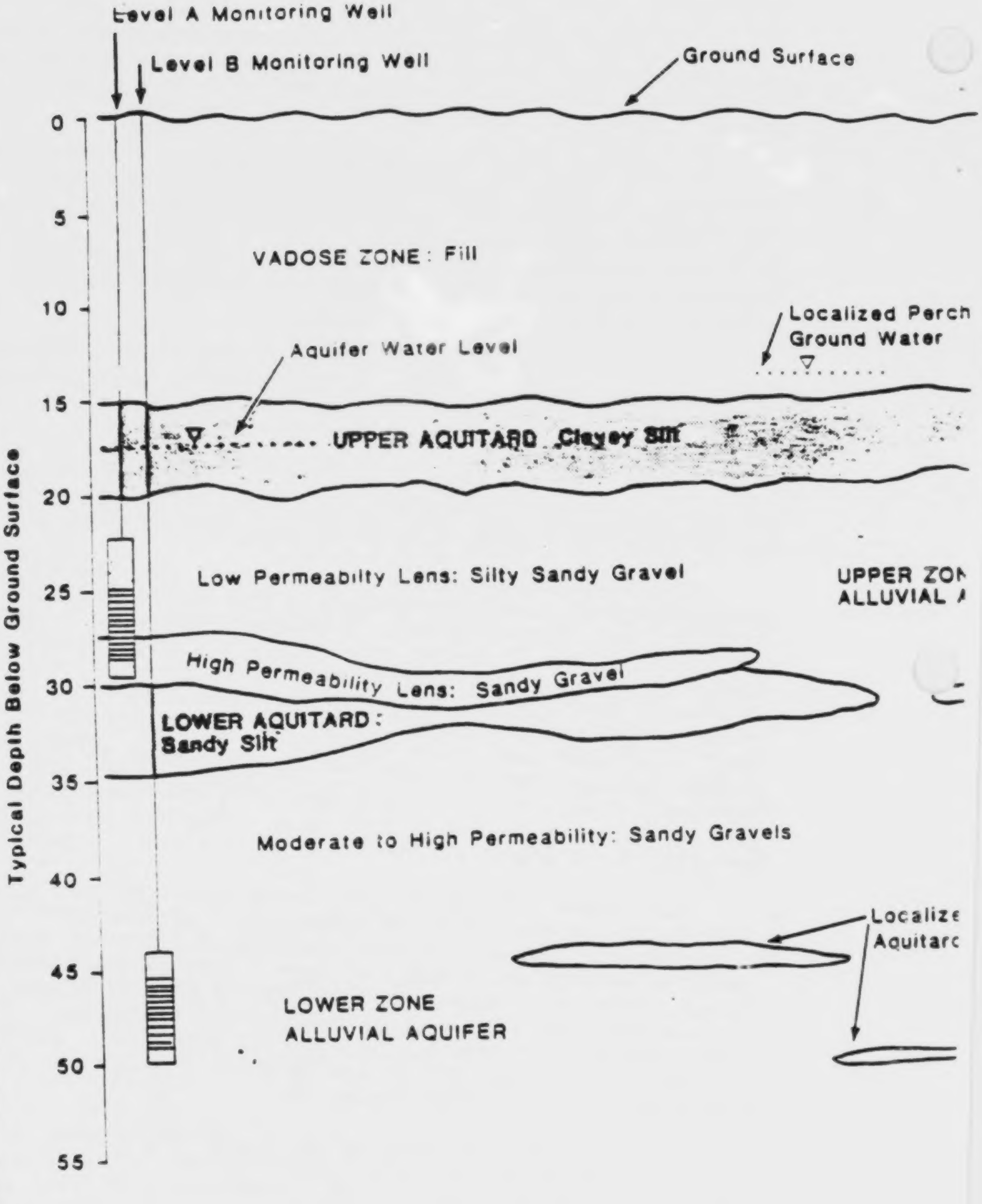

Level A Monitoring Well
Level B Monitoring Well
Ground Surface
Typical Depth Below Ground Surface
0
5
10
15
20
25
30
35
40
45
50
55
VADOSE ZONE: Fill
Localized Perch
Ground Water
Aquifer Water Level
UPPER AQUITARD Clayey Silt
Low Permeabilty Lens: Silty Sandy Gravel
UPPER ZON
ALLUVIAL A
High Permeability Lens: Sandy Gravel
LOWER AQUITARD:
Sandy Silt
Moderate to High Permeability: Sandy Gravels
Localize
Aquitarc
LOWER ZONE
ALLUVIAL AQUIFER

FIGURE 4
Conceptual D
of Site Area Hydrostr i
Frontier Hard C

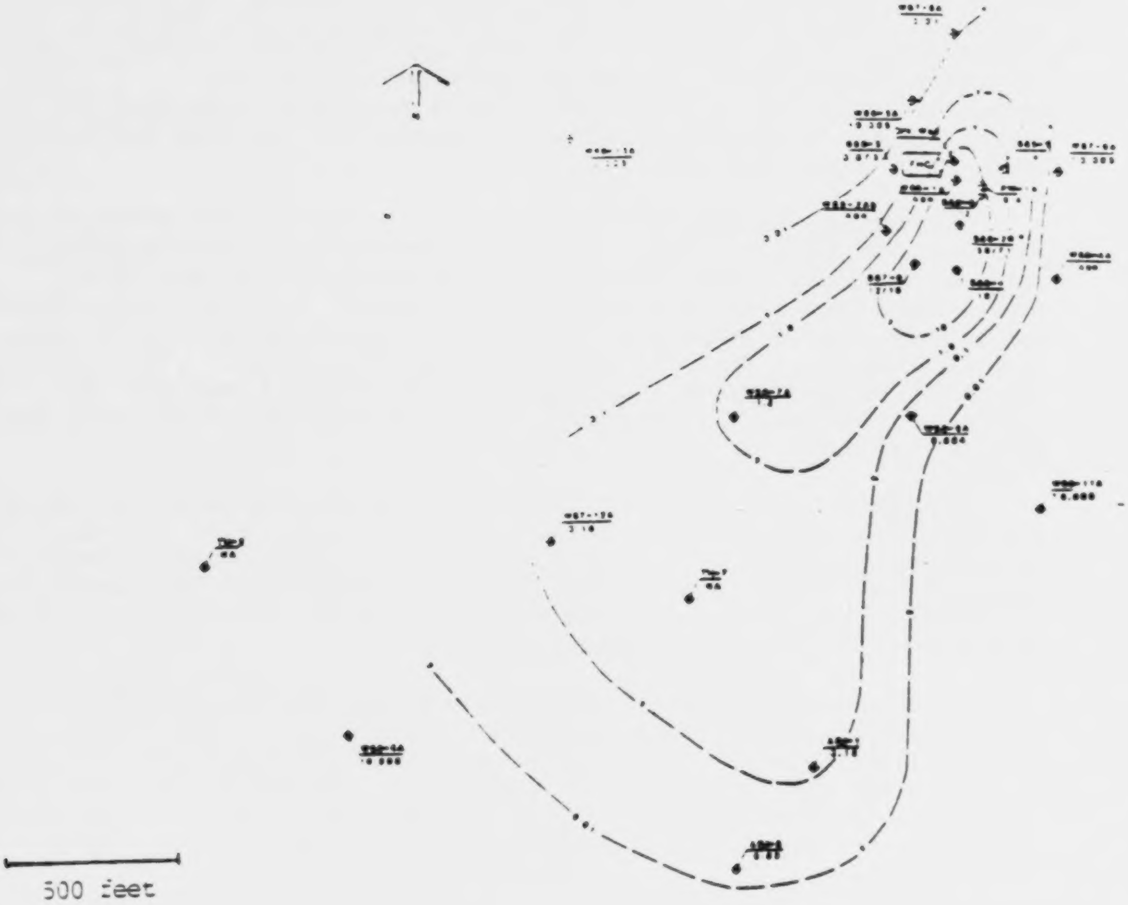


FIGURE 5
Inorganic Water Analysis
Level A Monitoring Wells
Hexavalent Chromium
Frontier Hard Chrome

concentrations of chromium were in the range of 0.3 ppm. Both of the aquifers were still above the drinking water standard of 0.05 ppm. (See Figure 6)

Organic contamination was confirmed in both layers. The contamination is highest to the north (upstream) of FHC. It is still not possible to identify the exact source of this contamination. Lower levels of the organics are found in the soils beneath the building on site and near the drywell. The organics identified include trichloroethylene and perchloroethylene. These were found in the groundwater at concentrations on the order of 40 parts per billion but also as high as 5 parts per million.

Chromium was found throughout the site in the surface and sub-surface soils. This includes adjacent properties where process cooling water had been discharged by FHC and where wastewater had migrated through the subsurface soil from the dry well. Levels of chromium in the soil range up to 17,000 ppm, total chromium. Most of the chromium was found to be trivalent. The most contaminated soils are in the area of the drywell. The depth of the most contaminated soils ranges up to 20 feet below grade. (Figure 7)

Surface water (in the form of standing puddles) on the site and on adjacent properties was sampled. The levels of chromium there are in the range of 0.01 to 0.9 ppm. The Columbia River itself was not sampled but discharge to the river was modeled. The model showed that no measurable increase of chromium would be detected in the river [illegible] the impact of the groundwater.

Air monitoring was conducted inside the FHC building during the investigation. Chromium was found in the air. The levels in the building were below the standard of 25 micrograms per cubic meter established for occupational settings. Chromium was also found on the walls and surfaces of the FHC building where the plating operation took place. The highest level found was 2300 micrograms per 50 square centimeters.

Soil/Source Control Operable Unit

During the FS, EPA and Ecology agreed that some form of soil/source control would be necessary. However, further evaluation of the necessity and extent of a groundwater remedial action was required. By agreement between the EPA and Ecology, consideration of the FHC remedial action was divided into two segments or operable units. The units consist of the soils at the FHC site and the groundwater aquifer below. Though the units are somewhat interdependent, the soil/source control unit can proceed without consideration of the final selected alternative for the groundwater.

This Record of Decision (ROD) discusses the soil/ source

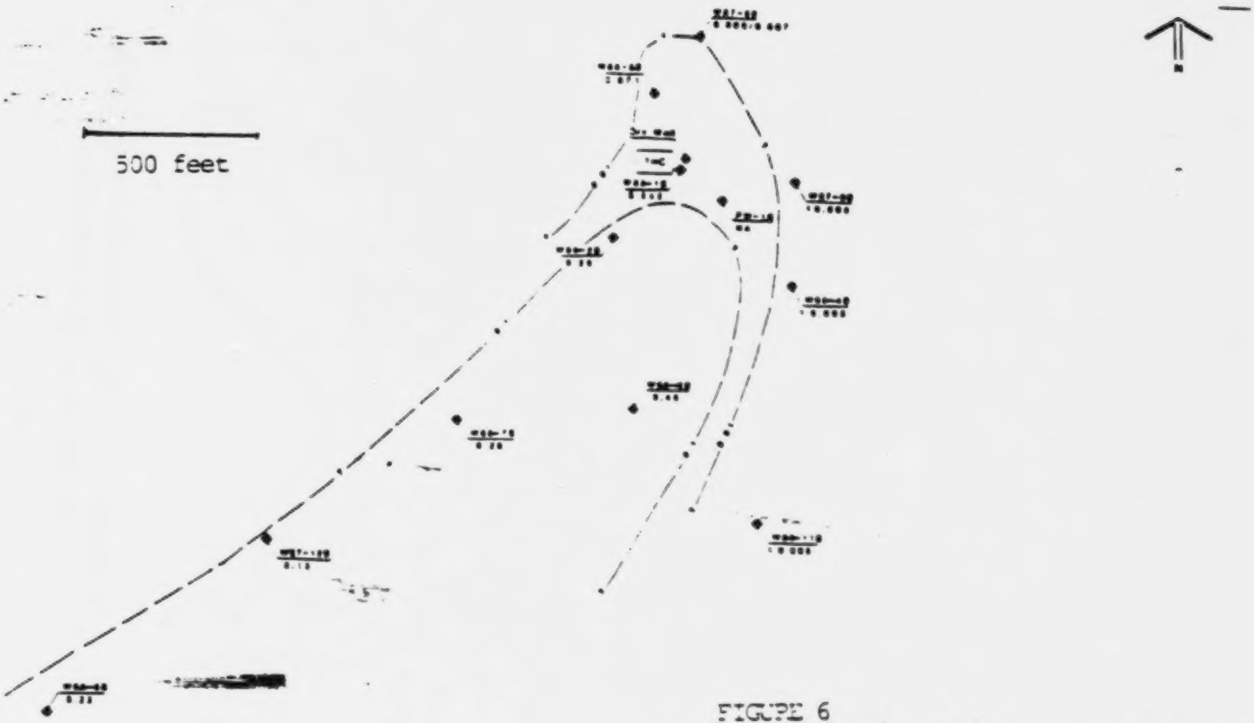
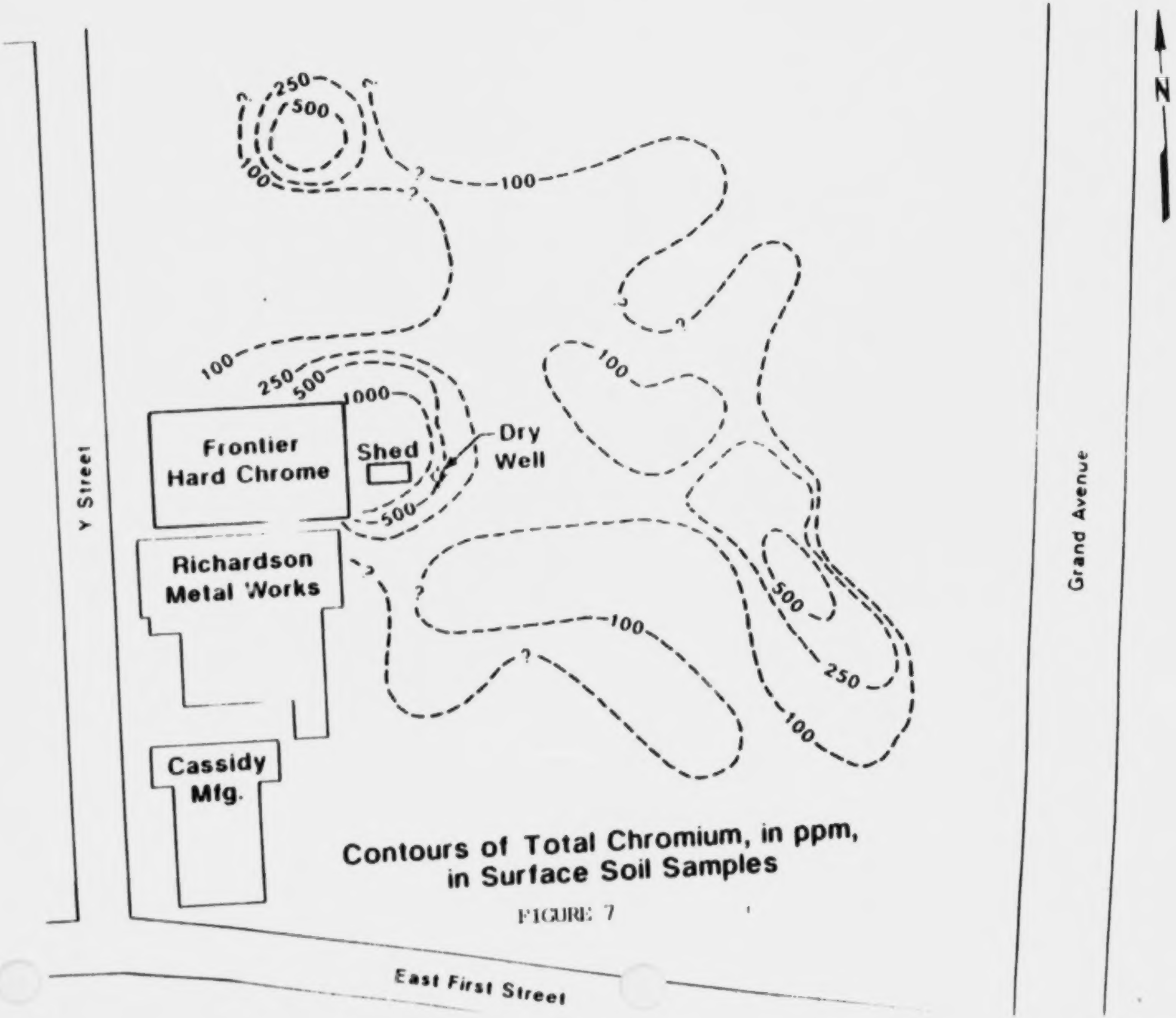


FIGURE 6
Inorganic Water Analysis
Level B Monitoring Wells Hexavalent Chromium
Frontier Hard Chrome


N
Grand Avenue
Y Street
East First Street
Frontier
Hard Chrome
Shed
Dry
Well
Richardson
Metal Works
Cassidy
Mfg.
100
250
500
1000
?

Contours of Total Chromium, in ppm,
in Surface Soil Samples

FIGURE 7

control operable unit only. A groundwater ROD will be signed when the EPA and Ecology have more thoroughly considered the options.

Feasibility Study

Endangerment Assessment

The endangerment assessment was conducted to evaluate the risk to public health posed by the site and to assist in determining the proper level of remedial response. The endangerment assessment examines the particular hazardous substances present at the site, the amounts of the substances which are found, the routes of exposure or how people would encounter those substances, and the levels of those substances which are known to cause harm. The determination of this level of risk provides an additional basis for the selection of a remedial action.

Chromium is the hazardous substance of primary concern at the FHC site. Chromium is present in two forms, designated trivalent chromium and hexavalent chromium. Of the two, hexavalent chromium is the more hazardous. Hexavalent chromium is a potential carcinogen when inhaled. The level of allowable chromium in the air is 25 micrograms per cubic meter based upon an occupational exposure of eight hours per day. For the protection of public health, the Maximum Contaminant Level for chromium is set at 0.05 ppm in drinking water. Chromium was found on the walls of the building but there is no standard method for evaluating the risk posed by chromium on surfaces.

Nickel and lead are also found at the facility. The contaminant levels of these substances is much less than the chromium. Remedial actions designed to mitigate the hazard from the chromium would also deal with the lead and nickel.

The risk from exposure to inorganic contaminants from direct contact and inhalation of airborne dust was investigated. Exposure was measured using personal air monitoring samples obtained from on site workers. Long term exposure was modeled based on surface soil contaminant concentrations. It was determined that the levels of exposure were well below the amount allowed in standards for occupational settings. Chromium and nickel at the site presently do not exceed the 10^{-7} cancer risk for long term airborne exposures. Lead would also present minimal risk at the site in that the levels do not exceed and are not expected to exceed the National Ambient Air Quality Standards. Though the levels of exposure were not zero, the additional risk imposed by the dust was negligible. These exposure estimates do not account for potentially higher short term exposures to dust due to vehicular traffic and wind. This increased risk was not quantified.

Organic solvents on the site pose some cancer risk through the contamination of the groundwater. At the site, the excess cancer risk associated with the ingestion of water containing solvents is approximately 10^{-2}. In areas that are not within the contamination plume, the estimated level of risk was found to be less than 10^{-7}, and zero at the City of Vancouver wells.

Surface water was examined near the site. Standing water in puddles were sampled for the presence of chromium. Chromium was found but at levels below the water quality criteria. Risk from exposure to the surface water was considered minimal. Any remedial action implemented which would address the soil contamination would reduce the contamination of the surface water on the site, further reducing any risk from this exposure. Risk due to contamination of the Columbia River was modeled and found to be negligible as the dilution of the river would not allow any measurable increase of chromium.

The greatest risk presented by the site is through the contamination of the groundwater and the drinking water supply with chromium. The aquifer is contaminated in excess of the drinking water standards. The groundwater in the area generally is used for drinking water but existing drinking water wells are not currently affected nor is it expected that they will be in the future. The risk from drinking contaminated water is based on the potential use of the water from the contaminated portion of the aquifer. This threat to the potential drinking water supply is expected to remain for over three hundred years if no actions are taken to remedy the site.

Alternatives Assessment

The alternatives evaluated in the FS are directed at the protection of public health and the environment. This ROD is specifically to address the hazards associated with the soils on the site. A ROD which addresses groundwater at the FHC site will be issued as a separate document. This Source Control/Soils ROD will deal with groundwater only in that the soils of the site present a continuing source of chromium to the groundwater and presents further threat to the groundwater. This direct threat to the environment would also be a threat to public health if the contaminated portion of the aquifer is accessed for drinking water. This ROD will not deal with the actual harm which the groundwater represents. The soils remedial action will therefore be evaluated on the ability of the alternatives to provide protection from direct or indirect exposure to the soil of the site and protection of the groundwater by eliminating the release of chromium.

The process of the FS is placed into several phases. The initial phase is the identification of potential remedial measures and technologies. These alternatives are screened for their site specific effectiveness and capabilities. The alternatives which survive the screening and would be potentially usable at this site are further evaluated with a detailed examination of their effectiveness, implementability and the costs involved in implementation.

Under Superfund, the assessment of the alternatives must take into account the protection of public health and the environment, short term and long term effectiveness, long term maintenance costs and the uncertainty and risk associated with land disposal.

Criteria have been established in policy which are used to evaluate alternatives to insure that the process meets the intent of the law. The criteria includes a preference for alternatives which result in the permanent decrease in the persistence, mobility, toxicity and volume of the hazardous material. The long term and short term effectiveness of the remedial action must also be considered. The assessment must consider the technical implementability and community and state acceptance of the alternative. The remedy selected must be protective of public health and the environment. The remedy must meet or exceed the applicable or relevant and appropriate state and federal requirements and must be cost effective, that is, the least cost alternative meeting the remedial objectives.

The range of potential alternatives initially considered is shown in Table 1. Alternatives which did not pass the initial screening were eliminated from further consideration. Specific treatment technologies within the general alternative categories shown in Table 1 were considered and evaluated.

The specific alternatives which passed the initial screening include: soil excavation and treatment; excavation and soil stabilization; excavation and disposal at an offsite location; excavation and disposal on site; removal of surface soils and capping only (with offsite disposal); and no further action. The no-action alternative must be evaluated throughout the alternatives assessment. The alternatives and their ratings against the various criteria appear in Table 2.

Selection of Remedy

The above evaluation identified several alternatives. The alternatives meet the objective and criteria for selection to varying degrees. The specific goals of the remedial action would be the protection of public health by preventing the direct exposure to chromium contaminated soils and dusts and the protection of the groundwater by controlling the source of contamination.

The no action alternative was the least cost alternative but would not remove any of the chromium source to the groundwater and would not mitigate the risk from direct contact with the chromium. This alternative would not reduce the toxicity or mobility of the contaminants nor would it reduce any threat to public health or the environment. This alternative would include

Table 1

Potential Remedial Alternatives

Alternative	Description	Analysis
No action	Monitoring of site only	Retained for consideration dud to regulatory requirements
Capping Surface soil removal	Placing an impermeable cap over the site to reduce contaminant leaching, direct exposure to contaminated soils	Retained for consideration
[illegible] fixation	Treatment of soils to bind contaminants to prevent leaching into groundwater and direct exposure to contaminated soils	Retained for consideration
Soil Removal/Disposal	Excavation and removal of contaminated soils with the disposal of the materials either on-site or off-site in a secure landfill	Retained for consideration
Soil Removal/Treatment	Excavation of soils, chemical treatment on-site or off-site, final disposal off-site or on-site	Retained for consideration
Biological Treatment	Use of bacteria in situ to break down contaminants	Rejected as technically infeasible for these contaminants
In-situ treatment	Chemical treatment of soils in place	Rejected as technically infeasible due to site specific conditions

Table 2

Summary of Remedial Alternatives

Alternatives	No Action	Capping	Removal/Disposal	Removal/treatment	Stabilization
Description	no further action monitoring only	places impermeable cap over site, limited soil removal	excavates contaminated soil with land disposal off-site	onsite treatment of soils (soil washing)	onsite stabilization of soils
Cost ($1000) Present worth	238	405	3,500	7,500	2,000
Protection of Public Health & Environment	allows direct contact w/ contamination allows further GW contamination	prevents public contact w/ soils allows further GW contamination	Alternatives protect public health by preventing the direct contact with chromium contaminated soils. Chromium is prevented from entering the groundwater eliminating the source of contamination		
ARARs	no attempt to meet regulations	would not meet RCRA	off site disposal would comply w/ RCRA	Placement of treated soils and alternate closure would comply with RCRA as appropriate standard	
Short term effectiveness	not effective	Alternatives would reduce the risk to the public from exposure to the soils			
		would not be effective in GW source control	All alternatives would eliminate immediate source of groundwater contamination		
		action would be completed within three months	remedial action would be completed within three months	would take two years to complete remedial action	remedial action would be completed within six months

Table 2
(continued)

Alternatives	No Action	Capping	Removal/Disposal	Soil Washing	Stabilization
Long term effectiveness	does nothing to protect in the long term, GW monitoring only	does not totally eliminate GW contamination, cap efficiency would decline over time	major source of contamination to GW removed from site permanently	effectively removes contamination from site	long term effectiveness of process not well known, has proved effective in appplication
Reduction of toxicity, mobility, persistence	Alternatives do not provide for the reduction of toxicity mobility or persistence.			Treatment alternatives reduce the mobility, toxicity of the contaminants, alternatives would alter the character of the hazardous constituents	
Technical feasibility, Implementability		Actions involve known technology and are proven and easily implemented		Physical/chemical characteristics of metals are known. Site specific feasibility to be tested, Large volume of material requires extended time for action, associated treatment systems	Stabilization effective in other locations, site specific feas. to be tested
Community, State Acceptance	These alternatives proposed at public meeting by citizens as the only actions necessary. Rejected as options by local government		These alternatives not recommended by the public which sees them as excessive, costly and unnecessary		recommended by the state as most cost effective source control rnative

continued monitoring to determine the continuing extent of contamination. This alternative is not favored by state or local governmental agencies but has been proposed by citizens attending public meetings.

Capping would be the placement of an impermeable surface over the site to prevent direct contact with the contaminated soils. This alternative is closely linked to the limited removal of contaminated soils at the surface only and are considered together as the actions utilize the same approach to contamination at the site. The cap might consist of asphalt or concrete paving or could consist of a coating which would seal the surface of the site. A cap would prevent the infiltration of precipitation through the soil column which would reduce the contamination source to the groundwater. The alternative would not be as effective or reliable as other alternatives at removing the source of groundwater contamination. This is because a large source of chromium to the groundwater is in the clay soils which are located in the saturated zone. Also, the effectiveness of the cap would deteriorate over time. Capping only would not meet the statutory preference for alternatives which would reduce the mobility or toxicity of the hazardous substance. Capping the site is an easily implemented and relatively low cost option. This option is favored by citizens who have attended the public meetings but is not favored by governmental agencies. This alternative, and all subsequent alternatives, include as part of the action long term monitoring of groundwater conditions.

Removal of the chromium contaminated subsurface soil from the site with disposal off site was evaluated. This alternative would effectively meet the direct contact goal and would remove the source of groundwater contamination, however, this alternative does not meet the criteria established which state that preference should be given to alternatives that utilize treatment for the reduction of toxicity and mobility of the contaminants and do not rely upon land disposal. This would apply to on-site as well as off-site disposal. This alternative could be implemented within six months.

The soil treatment alternative would remove the chromium from the surface and subsurface soil by excavation and chemical treatment. Contaminated soils would be excavated and placed in a treatment unit. The treatment process would remove the chromium by washing it from the soil. The treated soil would then be placed back on site. The chromium removed from the soil would require further treatment to reduce the toxicity prior to disposal. The site would then be capped. This alternative would both reduce the direct contact hazard to public health and remove the source of groundwater contamination. This alternative would also be responsive to the statutory preferences for treatment alternatives which provide a permanent response action. The soil treatment would require about two years to implement following design. The alternative would also require a system for treating the contaminated solutions which would result from the soil washing. Soil treatment is a relatively high cost option but would meet concerns for the mitigation of risk presented by the chromium.

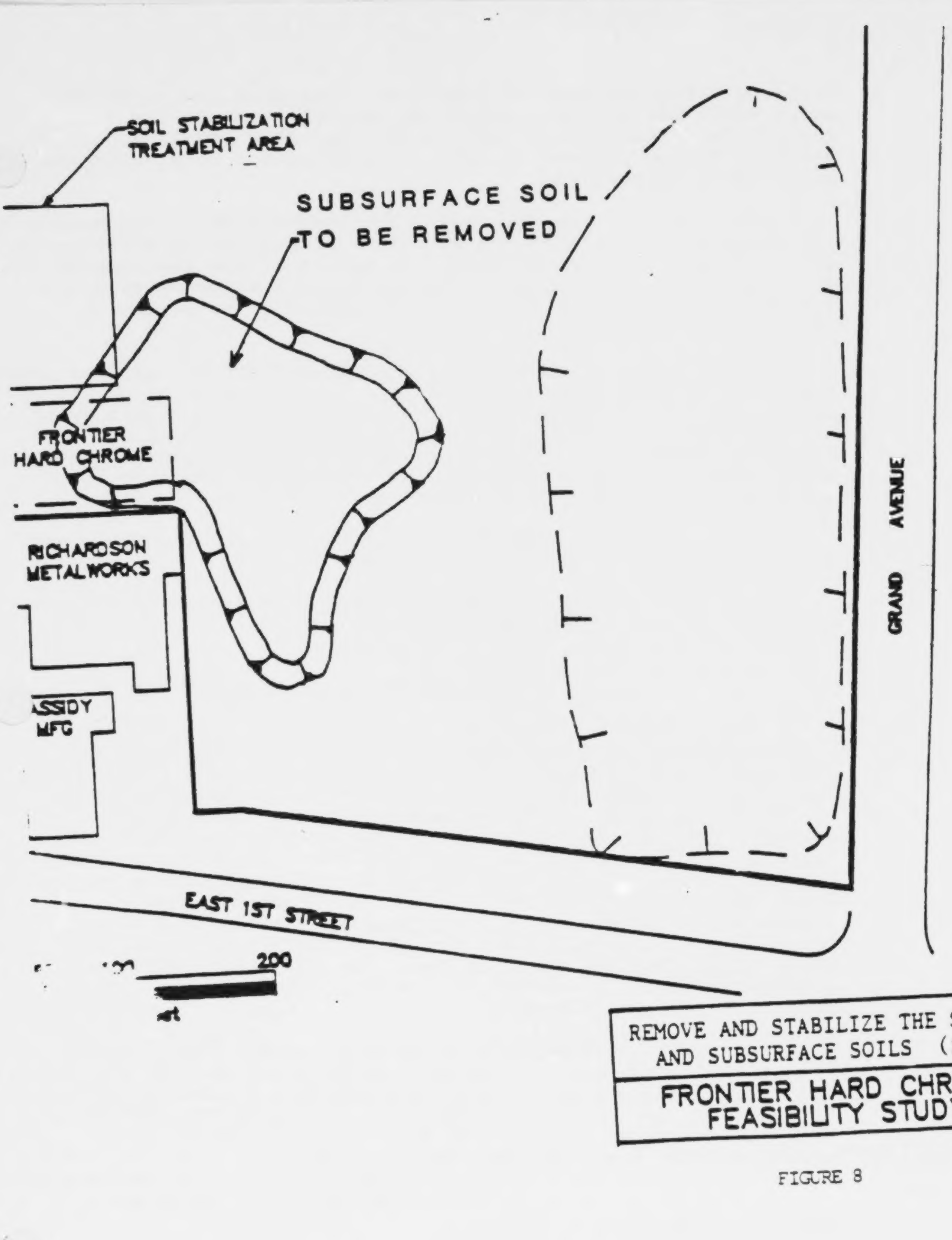
The final alternative evaluated was soil stabilization. It would utilize a chemical process which would transform the contaminated surface and sub-surface soils into a mass which would bind the chromium in the soil. As with the soil treatment alternative, the soils would be excavated and treated on site. The soil would be excavated and then mixed with chemicals to immobilize the chromium and then be placed back on the site. The site would finally be covered with an impermeable layer to assist in the control of surface run-off from precipitation. Stabilization would remove the threat to the groundwater and to direct contact with the contaminated soils. The alternative could be completed within 6 months not including testing and design. The process would require testing during the design process to insure the site specific feasibility of the process. Soil stabilization meets the preference for treatment alternatives and the permanent reduction of the toxicity and mobility of the hazardous substances.

The soil stabilization alternative was selected as the remedial action best meeting all of the criteria. The stabilization was favored over the soil treatment alternative for reasons including lower cost. The stabilization could also be implemented in a much shorter time and would minimize the amount of support activity required for remedial action, including treatment of contaminated water resulting from the treatment process. The site specific reliability of the stabilization is somewhat less than the soil treatment in that the stabilization is a more recently developed technique. The process of stabilization though has proven effective at similar sites.

Summary of the Remedial Action

The treatment system would use a chemical binding agent such as lime, polymers, fly ash or other, possibly proprietary mixtures, to chemically bind the chromium to the soil. The treatment would take place on the site. Surface and sub-surface soil exceeding a concentration of 550 ppm chromium would be excavated and put through the process. The stabilized soil would then be placed back in the excavation. The total volume of soil to be treated is estimated at 7400 cubic yards. The volume of soil is expected to increase by approximately 20% due to the treatment process. Implementation of the remedial action will require the demolition of the building on the site. (Figure 8)

Only those soils in excess of 550 ppm are to be treated. There is presently no standard which states a specific criteria for allowable chromium in the soil. The level of 550 ppm at this site was selected on the basis of tests performed at FHC. It was determined that soils with a concentration of less than 550 ppm would not release chromium to the groundwater at levels above


SOIL STABILIZATION TREATMENT AREA
SUBSURFACE SOIL TO BE REMOVED
FRONTIER HARD CHROME
RICHARDSON METALWORKS
ASSIDY MFG
GRAND AVENUE
EAST 1ST STREET
200

REMOVE AND STABILIZE THE SURFACE AND SUBSURFACE SOILS (SS)

FRONTIER HARD CHROME FEASIBILITY STUDY

FIGURE 8

drinking water standard of 0.05 ppm. Therefore the untreated soils would not act as a source of contamination to the groundwater. Additional testing will be conducted in the Remedial Design process to refine the threshold level of chromi which would be treated.

Additionally, the site would be covered with a impermeable cap which would minimize the amount of precipitation entering the soil. This would further limit the amount of any leaching of chromium which would occur. Also, risk from exposure to soils and dust could be further lowered by reducing the levels of chromium in the soils.

The selected alternative of soil stabilization complies with requirements that the remedial action be protective of public health and the environment, reduce the mobility and toxicity of the hazardous substances and not rely on land disposal of hazardous substances. Stabilization is also a permanent remedy which does not require future actions other than monitoring of the site and maintenance of the cover.

The alternative meets the preference for on-site treatment. The action would be solely confined to the site.

Soil stabilization is the cost effective alternative meeting the criteria and objectives for the site.

Compliance with Regulations

Superfund requires that all Applicable or Relevant and Appropriate requirements (ARARs) be achieved at the site. Among the potential ARARs for this site would be the drinking water standards for contaminated groundwater beneath the site. However, the soil stabilization remedy does not directly address cleanup of the groundwater (though it does remove the source of contamination.) Therefore, drinking water requirements are not ARARs for the purposes of this ROD. As discussed, the stabilization of the soils is an operable unit of the total remedial action. Therefore, this Record of Decision for the soils still complies with the law. The ROD which addresses the groundwater remedial action will address the drinking water standards as ARARs directly.

The implementation of this remedial action would comply with all ARARS. There are no standards which would dictate a criteria for chromium in the soil. The site specific determination made at the FHC site was to treat soils in excess of 550 ppm chromium. This determination was made relative to the drinking water standard which would be applicable in the cleanup of groundwater beneath the site. This level would also minimize direct contact or exposure to chromium contamination at levels which could possibly cause harm.

Washington State has regulations dealing with the disposal of solid and dangerous wastes. The stabilized soil would not be classified as a dangerous waste as defined in those regulations and would not be subject to those regulations. The requirements for the disposal of dangerous wastes under these regulations, however would be appropriate standards. The disposal of the stabilized soils as a solid waste would be applicable. All of these requirements would be met by the selected alternative.

The Resource Conservation and Recovery Act, as amended by the Hazardous and Solid Waste Amendments, (RCRA) is not specifically applicable to the FHC site or the remedial action (though it is relevant and appropriate.) The contaminated soils of the site are not subject to regulation under 40 CFR Section 261 of RCRA. The stabilized soils would also not be a characteristic waste (EP toxic) or listed waste under the definitions in RCRA. Further, because of the nature of the material as indicated, placement of the treated soils back on the site would not create a new disposal unit under RCRA.

Placement of the stabilized soils on the site would not be subject to the land disposal ban under RCRA. The rules do not presently regulate materials which would be involved in this operable unit of the remedial action. As regulations are developed which would address directly the disposal of chromium contaminated waste and debris, those regulations would be relevant and appropriate to this remedial action.

RCRA is relevant and appropriate as a standard in the requirements for the closure and long term care of the facility. This operable unit of the remedial action at the FHC site would meet the substantive requirements for an "alternate closure" under proposed rules governing closure found in 40 CFR Section 264.310 of RCRA.

Community Relations

There have been two public meetings for the purposes of informing the local population about the activities at the site. The initial meeting was held in 1984 at the commencement of the RI. The second meeting was held on November 4, 1987 to discuss the FS and the proposed alternatives.

Contamination from this site has resulted in the contamination of the drinking water aquifer utilized in this community. The present drinking water supply is not affected though the potential industrial and commercial development of the area may be. The public interest at this site has been limited.

The attendance at the meetings has been sparse. The meetings were attended by the responsible parties and by people directly associated with the operation of FHC. Adjacent property owners were also in attendance at the meetings. A transcript of the November public meeting was made and a responsiveness summary prepared. The responsiveness summary is attached.

Media interest in the site has been limited. The local media was in attendance at the November meeting. Much of the media interest centered around the cost of the work which has been conducted to date and the future costs.

FRONTIER HARD CHROME SITE
RESPONSIVENESS SUMMARY

This appendix summarizes the major issues raised by the public and provides agency responses to those issues. It is included as a part of this decision document in accordance with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, Section 67.

The responsiveness summary is divided into the following sections:

Section 1.0 Overview. This section discusses the preferred soil/source control alternative for corrective action, and general public reaction to this alternative.

Section 2.0 Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns regarding site activities.

Section 3.0 Summary of Major Comments Received During the Public Comment Period and Response to the Comments. Both verbal and written comments are categorized by relevant topics. EPA's responses to these major comments are also provided.

Section 4.0 Remaining Concerns. This section describes remaining community concerns that EPA should consider in planning the cleanup activities at the site.

1.0 Overview.

The Washington State Department of Ecology (Ecology), as lead agency under a cooperative agreement with the U.S. Environmental Protection Agency (EPA) conducted the Remedial Investigation and Feasibility Study (RI/FS) for the Frontier Hard Chrome (Frontier) Site in Vancouver, Washington. The site was the location of a chrome plating operation from 1958 until 1983. During the period of 1976 to 1983 process waste water containing chromium and other metals was discharged to an on-site dry well.

During the FS process for evaluating potential site cleanup alternatives, the EPA and Ecology agreed that some form of soil/source control would be necessary. However, they decided that further evaluation of the need and extent of a ground water remedial action is required. In order to allow initial cleanup to move forward, the agencies agreed to split the remedial action selection process into two phases, or operable units: a soil/source control remedy is selected in this Record of Decision (ROD) document, and an appropriate action for ground water will be addressed in a subsequent ROD.

Potential cleanup alternatives for both soil/source control and ground water were presented in the Feasibility Study, proposed plan, and public meeting. Ecology solicited and received public comment regarding the entire range of alternatives. However, since this ROD only addresses the soil/source control alternative selection, this Responsiveness Summary will only address that portion of public comment pertaining to soil/source control options. A subsequent ROD and Responsiveness Summary will address the ground water cleanup options and public comment regarding those.

The soil/source control cleanup alternative chosen in this ROD would remove surface and subsurface soil exceeding 550 ug/g chromium. The soil would be treated with a stabilization material, and be replaced on-site. The existing on-site structures would be removed and disposed in accordance with applicable state and federal regulations. Institutional controls would be necessary to restrict access to ground water within the contaminated plume and to protect the integrity of stabilized soils. This alternative is described in more detail in Chapter 6 of the Feasibility Study and in the text of this ROD.

This Responsiveness Summary describes concerns which the community has expressed in regard to the recommended soil/source control cleanup alternative, the purpose of the public participation process, and health issues. The most vocal and interested individuals, the site owners and adjacent businesses, have felt that the site studies have been too costly and time consuming and that the site does not present environmental or health impacts of enough significance to warrant much remedial action. On the other hand, the City of Vancouver public officials acknowledge that cleanup action of the magnitude recommended by this decision document is necessary.

2.0 Background on Community Involvement and Concerns.

Throughout the Frontier studies, Ecology has conducted a community relations program. This program involved identifying interested parties and public concerns, and conducting activities to meet the public's information needs and address concerns.

Interested Parties

Ecology and the Vancouver Public Works Department have been involved with the Frontier site since 1975 when the metals in Frontier's wastewater were first identified as a problem.

Since that time the news media has covered developments at the site. This media coverage has included project background, status, budget and funding, public meetings, and future plans.

Other than the news media attention, there has been little public concern shown. Parties who have expressed some interest or concern include: responsible local public agencies--such as the Vancouver Department of Public Works and the Southwest Washington Health District; owners of neighboring wells--such as the Washington School for the Deaf; neighboring business owners and those who were directly involved with past or current ownership or operation of the Frontier site.

Public Concerns

Since studies began at the Frontier site, the following concerns have been raised.

- Chemical contamination of drinking water sources from: chromium, lead, nickel and chlorinated solvents that have been detected in soil and water at Frontier and can affect human health. The original designation of Frontier as a National Priority Site was primarily a result of agency concern over the potential of chromium contaminated ground water originating from the Frontier site to contaminate Vancouver Well Fields 1 and 4.

  AGENCY RESPONSE: Thirty-seven ground water monitoring wells were installed during the Remedial Investigation (RI). The direction of ground water flow and location-specific changes in ground water contaminant levels over time were determined from periodic monitoring activities at each well location. Aquifer pump testing was also conducted during the RI and all these data were used to model the long-term migration of ground water contamination. These studies have shown that it is very unlikely that the site contaminants would impact existing drinking water wells.

- Soil Contamination: Exposure to chromium and other heavy metals could occur through direct contact with contaminated dust or soil.

  AGENCY RESPONSE: Sampling and analysis of surface and subsurface soils was conducted to determine the distribution and levels of soil contamination, and to evaluate potential health impacts caused by the soil contamination.

- Project Expenses and Schedule: Vancouver public officials and Vancouver area newspaper articles have focused on the expenses of the project. They have suggested that the time and money spent studying the problem could have been spent on cleanup.

  AGENCY RESPONSE: Rationale for the nature and extent of site studies have been explained to the City officials and the media. The requirements of the Superfund study process and the complexities of the environmental contamination at the Frontier site dictated the extent and cost of site studies necessary to protect public health and the environment.

- Effect on Property Development: Ground water and soil contamination have affected the current use of the site. The proposed remedial measures will further limit development potential of the site and probably of neighboring properties because of the regulatory controls necessary to protect the stabilized soil and restrict the development of the contaminated ground water. The area is generally considered a prime location for industrial development.

AGENCY RESPONSE: It is acknowledged that development potential of the site and property adjoining the contaminated plume may be limited as a result of the contamination.

- Communications: Vancouver officials have expressed concern that there be clear channels of communication between Ecology and the City, and that the City be notified of any critical developments and schedules.

  AGENCY RESPONSE: Periodic communication has been maintained with various City officials throughout the duration of project activities. A separate briefing was provided to these officials to describe study results, to discuss alternative plans for remedial action, to receive comments, and to answer questions.

Community Relations Activities

Ecology prepared the initial Community Relations Plan in 1984. This plan outlined community concerns, interested parties, and the scheduled community relations activities. Prior to preparation of the plan, Ecology interviewed local officials to identify concerns. Information repositories for project documents were established at the main branch of the Vancouver Public Library and at the City of Vancouver Public Works Department.

To explain the Remedial Investigation and the planned field work, Ecology issued a fact sheet and held a public meeting in October 1984. The fact sheet was distributed to the mailing list of local officials and other interested parties. The meeting was announced through a news release and a public notice. Thirteen citizens, primarily the Potentially Responsible Parties (PRP's) and Vancouver city officials attended the meeting.

Throughout the studies, Ecology notified the press at key points in the project. In August 1987, a revised Community Relations Plan was prepared for Ecology and the mailing list was updated. In preparing the plan, four local officials were interviewed.

At completion of the Remedial Investigation and Draft Feasibility Study, Ecology issued a Proposed Plan summarizing the results of these studies and presenting the proposed alternatives for 1) controlling the source of contamination and 2) correcting ground water contamination problems. This proposed plan, as well as a news release and public notice, also announced the public comment period and the public meeting of November 4, 1987. This public meeting was held to present the results of the Remedial Investigation and Feasibility Study, to discuss alternative plans for remedial action, to answer questions, and to receive written and oral comments. Thirteen citizens and five news media representatives attended the meeting.

As the project developed, Ecology periodically briefed local officials regarding project activities. A formal public officials briefing on the results of the Remedial Investigation and Feasibility Study was held prior to the public meeting November 4, 1987. The briefing was attended by about 11 local officials.

3.0 Summary of Major Comments Received During the Public Comment Period and Agency Responses to the Comments.

The public comment period occurred from October 29 to November 19, 1987. A transcript of the public meeting proceedings is provided as Appendix B to this decision document. Written comments were received from the City of Vancouver Public Works Department and are included as Appendix A.1 to this responsiveness summary.

Comments from the public, (e.g., the site owners, site tenant, neighboring businesses and City of Vancouver public officials) obtained during the public comment period are summarized below. Comments are grouped under the following headings: human health and environmental concerns, alternative preferences, public participation process, and general.

In summary, comments from the City of Vancouver Public Works Department favor the agency recommended alter-native for source/soil control. The City has also suggested that the subsequent Record of Decision regarding ground water cleanup should include consideration for a limited extent of ground water treatment. The site owners, tenant, and neighboring businesses favor only limited action toward soil/source control, possibly to cover part of the site surface with a paving material and do nothing more. That position is predicated on the notion that risk to the environment and public health is not significant enough to warrant much cleanup action, and that residential development of the area is very unlikely.

Human Health and Environmental Concerns

1) A general issue was raised by the Potentially Responsible Parties to suggest that any major cleanup actions proposed for the site are not warranted because impact to the environment or to public health is not imminent. The health significance of contaminated soils, ground water, and migration of ground water contaminants to the Columbia River were questioned.

AGENCY RESPONSE: Based upon the data and information generated in the RI, the City of Vancouver Well Fields 1 and 4 are located upgradient from the Frontier Hard Chrome site. There is no indication that the pumping capacity, drawdown, or extent of any cone of depression from these two well fields influences the movement direction of the contaminant plume of Cr+6 emanating from the FHC site. The studies show that the contaminant plume does not presently and is not expected in the future to impact existing drinking water wells. Continued monitoring well observations in the FHC vicinity will be conducted to ascertain any changes in contaminant levels or gradient of the ground water. There is concern however, that there could be serious implications to public health if drinking water wells were to be installed within the area of the ground water contaminant plume. For this reason, certain land use restrictions, or institutional controls will be defined and applied to restrict access to the contaminant plume. Additionally, some form of institutional control(s) may be implemented to ensure that future land use activities will not interfere with the stability or integrity of stabilized soils. These institutional controls may be required regardless of future decisions about ground water cleanup needs. Contaminated subsurface soils are not expected to cause any direct public health impacts. High concentrations of chromium occur in these soils, however and serve as a supply of continual contamination to the ground water. A response regarding health concerns pertaining to surface soils is provided in part 2 of this section. Based upon data and information gathered and presented in the RI and FS, there appears to be no adverse effects on the public health or on water quality as chromium contaminated ground water discharges into and is diluted by the Columbia River.

However, the agencies jurisdiction to respond with site cleanup is not predicated solely on actual or demonstrated risk to the public or the environment. While actual environmental damage has been documented, we are very fortunate that actual or current public health risk is insignificant. However, substantial risk would be certain if the contaminated ground water is used for drinking. We are allowed to conduct a site response solely on that potential risk, if necessary.

2) A question was raised by the current site tenant regarding what if any occupational health risks may be present at the site.

AGENCY RESPONSE: The potential for human health hazard associated with inhalation of contaminated surface soils (i.e., dust) were evaluated in two ways. A limited number of direct measurements were obtained from personal air monitors worn by workers using the FHC building and site. Direct measurements collected from workers showed no concentrations of chromium or nickel over occupational standards.

Modeling of air concentrations of chromium, nickel, and lead was conducted to assess the expected long-term health impact associated with contamination found at the FHC site. This modeling work showed that the long-term risk associated with inhalation of re-suspended contaminated soil at FHC is minimal. The model could not evaluate the short-term inhalation hazard; however, based on the direct measurements and long-term modeling conducted, it is not expected that the short term inhalation hazard is significant.

Alternative Preferences

1) The general tone of the public meeting comments favored the "no-action" alternative for the site cleanup. The "no-action" preference for ground water remedy was based primarily on the feeling that it would be very unlikely for someone to be inter-

ested in installing a drinking water well in the contam-inated ground water plume since the area could be adequately served by the City of Vancouver public water system. A specific comment from the Potentially Responsible Parties suggested preference for a form of the "SO" or "surface only" alternative as identified in the Feasibility Study (FS). The comment proposed that blacktop (i.e., asphalt) could be used to pave the site and isolate surface dust.

AGENCY RESPONSE: The contaminated ground water does not currently impact existing drinking water wells because the wells are located upgradient of the contaminated plume. However, the studies conclude that under the "no-action" alternative, serious health impacts from drinking the contaminated ground water could occur for 200 to 300 years. At this time we cannot predict the future public demand of this ground water over the next 300 years. More importantly, the ground water is regulated under both federal and state laws as a drinking water resource because of its potential use as drinking water.

The surface soil removal alternative (SO) which involves removal and disposal of the upper 18" of soil contaminated over 550 ppm Cr; replacement of the soil with clean fill; cleaning and sealing of the building; and monitoring of ground water was not selected since it does not eliminate the major portion of soil contamination which acts as a continued source of chromium to the ground water. Capping of the site surface with an impermeable cap was not evaluated in detail in the FS since an impermeable cap would not prevent leaching of chromium from subsurface soils to the ground water. Chromium is present in these soils at high concentrations, particularly within the silt/clay layer at a depth of approximately 15 feet. These soils are in contact with ground water and act as a continual source of chromium to the ground water.

2) Written comment from the City of Vancouver favored the agency proposed alternative and also suggested that some degree of ground water extraction and treatment should be conducted. A copy of the correspondence is provided as Appendix A.1 to this Responsiveness Summary.

AGENCY RESPONSE: The soil/source control preferred alternative as described in the FS report and this decision document is consistent with the wishes of the City of Vancouver, except that it does not provide for treatment of the groundwater. A subsequent Record of Decision will address the extent of ground water remedial action needed for this site.

Public Participation Process

1) The Potentially Responsible Parties (PRP's) asked what steps are involved in the cleanup selection process. It was asked: who makes the decision, how and when is the decision made, and does

the public really have any influence to the decision?

AGENCY RESPONSE: EPA and Ecology have encouraged the public to comment on the proposed alternatives for the site by providing a public comment period and by holding a public meeting. However, the final decision is to be made by EPA. Although it is an agency process once the comment period is closed, the decision must be responsive to public concerns. Comments from the public meeting on November 4, 1987 and from the comment period of October 29 to November 19, 1987 are summarized in this Responsiveness Summary. This document is part of the decision-making process and is an integral part of the Record of Decision to show how the agencies have responded to public concerns. The Record of Decision on the soil alternatives will be finalized and available by December 31, 1987, and a separate Record of Decision on the ground water alternatives will be finalized and available in spring 1988.

2) A point was made that the community interest in the site is limited to the site owners, tenants, and nearby businesses. The public, (i.e., Vancouver residents) were obviously absent from public meetings about the site and therefore appeared unconcerned.

AGENCY RESPONSE: We acknowledge this comment.

General Issues

1) Strong opinion was voiced by the PRP's that the site should not have qualified for nomination to the National Priorities List (NPL). It was felt that information pertaining to the vulnerability of the nearby municipal water supply wells had been misrepresented and that unfairly influenced the sites' nomination to the NPL.

AGENCY RESPONSE: The Frontier Hard Chrome site was nominated to the NPL based upon the potential of a public water supply well serving greater than 10,000 people of becoming contaminated with hexavalent chromium. Additionally, the fact that an industrial supply well showed a concentration of hexavalent chromium (Cr+6) exceeding the Drinking Water Standard for Cr+6 also was a factor in NPL nomination.

2) Concern was raised regarding the long-term reliability of the stabilized soil mixture as identified in the preferred alternative.

AGENCY RESPONSE: Several stabilization technologies will be explored as part of the remedial design process. The long-term stability and effectiveness of these technologies will be assessed through leach and strength testing as part of this design phase. It is expected that the stabilization technology selected will provide long-term immobilization of metals in the soil and produce a substance of adequate load-bearing capacities.

4.0 Remaining Concerns

Several issues have been addressed but are not yet completely resolved. These issues include:

- What mechanisms are available for implementing and enforcing institutional controls to restrict access to the plume of contaminated ground water and protect the integrity of stabilized soils? The availability of existing institutional controls is being researched in order to define the need and appropriate authorities for additional land use controls.
- How will storm water runoff be drained from the site area? An estimate of site storm water runoff volume will be calculated, and that information applied to select and design an appropriate storm water drainage system.
- What processes are appropriate for disposition of water encountered during excavation of source soils? This will be addressed as part of the remedial design process.
- To what degree is cleanup of the contaminated ground water appropriate? This will be addressed during the Record of Decision for ground water cleanup in the spring of 1988.
- How would the governments resolve potential problems if business operations are dislocated as a result of remedial operations. Agency legal counsel are evaluating the legal implications of remedial operations upon business activities.

INDEX TO ADMINISTRATIVE RECORD FOR FRONTIER HARD CHROME

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000001.	Pre Superfund correspondence and enforcement actions	Letter re discharge of processing waste water	12/17/75	2	Richard N. Aiken, City of Vancouver	Frontier Hard Chrome, Inc.
00000002.	Pre Superfund correspondence and enforcement actions	Letter re review of water use and disposal problems and recommendations for solutions	3/22/76	2	Bryan M. Johnson, Seton Johnson & Odell, Inc.	Bill Noldt, Frontier Hard Chrome, Inc.
00000003.	Pre Superfund correspondence and enforcement actions	Letter re use of cooling tower vs. well	4/22/76	1	Bryan M. Johnson, Seton Johnson & Odell, Inc.	Edmond Hayes, Jr., CWS Corp.
00000004.	Pre Superfund correspondence and enforcement actions	Letter re schedule for installation of temporary plumbing system	6/7/76	2	Bryan M. Johnson, Seton Johnson & Odell, Inc.	Richard N. Aikens, City of Vancouver
00000005.	Pre Superfund correspondence and enforcement actions	Letter and attached drawings of flow diagram and plot plan re temporary system for effluent disposal	6/9/76	3	Bryan M. Johnson, Seton Johnson & Odell, Inc.	Kester Tyler, Frontier Hard Chrome
00000006.	Pre Superfund correspondence and enforcement actions	Letter re inspection of temporary waste facilities	7/16/76	2	Richard N. Aiken, City of Vancouver	Kester Tyler, Frontier Hard Chrome
00000007.	Pre Superfund correspondence and enforcement actions	Letter re status of installation of temporary plumbing system	7/21/76	2	Waldemar Seton, Seton Johnson & Odell, Inc.	Richard N. Aikens, City of Vancouver
00000008.	Pre Superfund correspondence and enforcement actions	Letter re proposed plumbing changes	9/9/76	1	Doug Martin, Seton, Johnson & Odell, Inc.	Richard N. Aikens, City of Vancouver
00000009.	Pre Superfund correspondence and enforcement actions	Letter re proposed plumbing changes	9/23/76	1	Doug Martin, Seton, Johnson & Odell	Richard N. Aikens, City of Vancouver
00000010.	Pre Superfund correspondence and enforcement actions	Memo re meeting recap, Frontier Hard Chrome/DOE/City of Vancouver on 2/16/77	2/27/77	1	Jerry Keesee, City of Vancouver	Tom Eccleston
00000011.	Pre Superfund correspondence and enforcement actions	Letter re discharge of industrial waste to sanitary sewer system and ground	4/11/77	1	Richard N. Aiken, City of Vancouver	Herb Nissen, Frontier Hard Chrome

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000012.	Pre Superfund correspondence and enforcement actions	Memo re meeting recap, Frontier Hard Chrome and City of Vancouver	4/26/77	1		Hugh James, Jerry Calkins, Tom Eccleston, meeting attendees
00000013.	Pre Superfund correspondence and enforcement actions	Letter re recommendations for improvement in waste water disposal system	2/10/78	2	Tom Rolby	Herb S. Nissen, Frontier Hard Chrome
00000014.	Pre Superfund correspondence and enforcement actions	Statement describing proposed pollution abatement program (including one page of handwritten notes)	5/2/77	3	Frontier Hard Chrome	
00000015.	Pre Superfund correspondence and enforcement actions	Letter re progress on completion of Phase I of pollution abatement program	10/17/77	2	Herb Nissen, Frontier Hard Chrome	Dick Aiken, City of Vancouver
00000016.	Pre Superfund correspondence and enforcement actions	Letter re reasons for lack of progress on pollution control program	11/21/78	1	Herb Nissen, Frontier Hard Chrome	Gerald Calkins, WDOE
00000017.	Pre Superfund correspondence and enforcement actions	Letter re progress on and proposed schedule for completion of waste treatment system	3/3/80	2	Herb Nissen, Frontier Hard Chrome	Gerald Calkins, WDOE
00000018.	Pre Superfund correspondence and enforcement actions	Letter re escape of nickel from Niklad #791 system	12/23/80	1	J. R. Duchene, Allied-Kelite Products Div.	R. Tyler, Frontier Hard Chrome
00000019.	Pre Superfund correspondence and enforcement actions	Letter re estimate of water usage per day	3/23/81	1	Herb Nissen, Frontier Hard Chrome	Mike Morhous, WDOE
000000020.	Pre Superfund correspondence and enforcement actions	Letter re compliance by Frontier Hard Chrome with state discharge permit	5/3/82	1	Thomas D. Boyer, City of Vancouver	Howard Steeley, WDOE
00000021.	Pre Superfund correspondence and enforcement actions	RCRA inspection report	3/31/82	3	Eric Egbers, WDOE	File
00000022.	Pre Superfund correspondence and enforcement actions	Letter re compliance by Frontier Hard Chrome with State Discharge Permit and chronology of correspondence between City, WDOE and Frontier Hard Chrome	5/3/82	1	Thomas D. Boyer, City of Vancouver	Howard Steeley, WDOE

Doc. #	.e	Type/Description	Date	# Pages	Author/Organization	Addressee/Organiza
00000023.	Pre Superfund correspondence and enforcement actions	Letter and revised version of State Waste Discharge Permit #5072	5/18/82	7	E. W. Asselstine, WDOE	Herb Nissen, Frontier Hard Chrome
00000024.	Pre Superfund correspondence and enforcement actions	Letter, explanation and information sheets re proposed waste treatment facility and financing of same	5/21/82	5	Herb Nissen, Frontier Hard Chrome	Howard Steeley, WDOE
00000025.	Pre Superfund correspondence and enforcement actions	Letter re hexavalent chromium contamination of ground water	5/24/82	1	Howard Steeley, WDOE	Herb Nissen, Frontier Hard Chrome
00000026.	Pre Superfund correspondence and enforcement actions	Letter re request for modification to State Waste Discharge Permit	6/2/82	2	Herb Nissen, Frontier Hard Chrome	Howard Steeley, WDOE
00000027.	Pre Superfund correspondence and enforcement actions	Letter re proposed sampling plan for Frontier Hard Chrome	7/22/82	1	D. A. Myers, Battelle Pacific Northwest Labs	Howard Steeley, WDOE
00000028.	Pre Superfund correspondence and enforcement actions	Letter re comprehensive ground water study for Frontier Hard Chrome	8/20/82	2	Eric R. Egbers, WDOE	Herb Nissen, Frontier Hard Chrome
00000029.	Pre Superfund correspondence and enforcement actions	Memo re 3/31/82 analysis of Frontier Hard Chrome sample #83-1499	12/27/82	1	Merley McCall, WDOE	Eric Egbers, WDOE
00000030.	Pre Superfund correspondence and enforcement actions	Memo re Frontier Hard Chrome chronology	1/7/83	6	Howard Steeley, WDOE	John Spencer, WDOE
00000031.	Pre Superfund correspondence and enforcement actions	Memo with attached draft Order and Recommendation for Enforcement action re recommendation for issuance of Cease Discharge Order to Frontier Hard Chrome	1/11/83	6	Jon Neel, WDOE	Norm [illegible], [illegible]
00000032.	Pre Superfund correspondence and enforcement actions	Recommendation for enforcement action against Frontier Hard Chrome	1/3/83	2	Eric B. Egbers, WDOE	Enforcement Officer, WDOE
00000033.	Pre Superfund correspondence and enforcement actions	Memo re recommendation for issuance of regulatory order under RCW 90.48.120 to Frontier Hard Chrome	1/5/83	3	Eric Egbers, WDOE	Howard Steeley, WDOE
00000034.	Pre Superfund correspondence and enforcement actions	Letter and attached WDOE Order re lack of compliance with order by Frontier Hard Chrome	5/26/83	2	Charles K. Douthwaite, Washington Attorney General's Office	R. DeWitt Jones

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00000035.	Pre Superfund correspondence and enforcement actions	Washington DOE Order, Docket #DE83-117 re discharge of waste water by Frontier Hard Chrome	1/21/83	2	Bruce A. Cameron, WDOE	Herb Nissen, Frontier Hard Chrome
00000036.	Pre Superfund correspondence and enforcement actions	Letter re waste water plans and specifications and attached comments	1/11/83	4	C. Jonathan Neel, WDOE	Herb Nissen, Frontier Hard Chrome
00000037.	Pre Superfund correspondence and enforcement actions	Letter re proposed program in applying for permits	2/4/83	2	John Harland, Seton, Johnson & Odell	Herb Nissen, Frontier Hard Chrome
00000038.	Pre Superfund correspondence and enforcement actions	Letter with attached Notice of Compliance with Order, Docket #DE83-118 re termination of all commercial chrome operations and discharge of water	2/24/83	2	Otto Neth, Frontier Hard Chrome	Gail Reyes, WDOE
00000039.	Pre Superfund correspondence and enforcement actions	Memo of notes from meeting re status of projected course of action for Frontier Hard Chrome	4/15/83	2	Phillip M. Wong, EPA	Meeting attendees
00000040.	Pre Superfund correspondence and enforcement actions	Memo re Frontier Hard Chrome status as a Superfund site	4/19/83	2	Earl W. Taller, WDOE	D. Rodney Mack, WDOE
00000041.	Pre Superfund correspondence and enforcement actions	Letter re decline in chromium levels in well water and continued monitoring	6/14/83	2	R. DeWitt Jones, Attorney	Charles K [illegible]uthwaite, Assistant Attorney General, State of Washington
00000042.	Pre Superfund correspondence and enforcement actions	Draft Complaint for Injunctive Relief and Cost Recovery against Frontier Hard Chrome and Otto Neth	7/21/83	8	Charles K. Douthwaite, Assistant Attorney General - State of Washington	---
00000043.	Pre Superfund correspondence and enforcement actions	Maps and diagrams of Frontier Hard Chrome	---	13	---	---
00000044.	Pre Superfund lab analyses and data	Water well report - State of Washington	4/26/73	1	---	---
00000045.	Pre Superfund lab analyses and data	Water well report - State of Washington	3/19/73	1	M. Johnson, Hansen Drilling Co.	---
00000	Pre Superfund lab analyses and data	Data summary re two water samp	9/5/75	1	WDOE - Water Quality Laboratory	---

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00000047.	Pre Superfund lab analyses and data	Data summary re two water samples from Frontier Hard Chrome	9/12/75	1	WDOE - Water Quality Laboratory	G. Calkins, H. Steeley, V. Meinz and lab files
00000048.	Pre Superfund lab analyses and data	Excerpt from consultant report re City of Vancouver's well field with attached lab reports and charts of predicted performance re Vancouver Station 4	1981	11	Chandler Ellis, Robinson & Noble, Inc.	---
00000049.	Pre Superfund lab analyses and data	Lab report re chrome in water samples from wells 1 and 5, Station 4	6/11/82	1	Susan M. Coffey, Coffey Laboratories	Larry Gruber, City of Vancouver
00000050.	Pre Superfund lab analyses and data	Data summary - metals re sample from Frontier Hard Chrome	4/30/82	1	WDOE - Environmental Laboratory	M. McCall Morhous
00000051.	Pre Superfund lab analyses and data	Data summary re Sample #82-1499 from Frontier Hard Chrome	5/4/82	1	G Freeman, WDOE--Olympia Environmental Laboratory	Mike Morhous, Eric Egbers, Howard Steeley
00000052.	Pre Superfund lab analyses and data	Memo re 96-hour bioassay information on water sample from Frontier Hard Chrome	5/11/82	1	Don Kjosness, WDOE	Michael Morhous, WDOE
00000053.	Pre Superfund lab analyses and data	Data sheet for static basic acute fish toxicity test re Frontier Hard Chrome	5/19/82	1	G. Freeman, WDOE--Olympia Environmental Laboratory	---
00000054.	Pre Superfund lab analyses and data	Request for analysis re sample with laboratory #82-1499	3/31/82	1	Mike Morhous, WDOE	WDOE
00000055.	Pre Superfund lab analyses and data	Letter with attached well water, effluent and river water samples analysis results and data summary sheets re samples 82-2126, 82-2889, 82-2890, 82-2891 and 82-3091	7/1/82	8	Ronald E. Perry, FMC Corp.	Howard R. Steeley, WDOE
00000056.	Pre Superfund lab analyses and data	Data summary sheets re sample #13-0431	2/25/83	2	G. Freeman, WDOE--Olympia Environmental Laboratory	Howard Steeley, Jon Neel
00000057.	Pre Superfund lab analyses and data	Laboratory report re two water samples taken from wells numbers 1 and 6	3/30/83	3	Van Waters & Rogers of Univar	E. Tyler and H. Nissen, Frontier Hard Chrome

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00000058.	NPL listing and comments	National Priorities List Site information re Frontier Hard Chrome	--	1	U.S. EPA/Remedial Response Program	---
00000059.	NPL listing and comments	Excerpt from Federal Register, Vol. 47, #251, re amendments to National Oil and Hazardous Substance Contingency Plan; the National Priorities List - Proposed Rule	12/30/82	9	EPA	---
00000060.	NPL listing and comments	Excerpt from Federal Register, Vol. 48, #175, re amendments to National Oil and Hazardous Substance Contingency Plan; National Priorities List - Final Rule	9/8/83	18	EPA	
00000061.	Remedial action master plan	Remedial action master plan for Frontier Hard Chrome	9/26/83	57	CH2MHill	EPA
00000062.	Site inspection reports	Inspection report re Frontier Hard Chrome	8/13/75	1	Gerry Calkins, WDOE	Howard, Vern and files
00000063.	Site inspection reports	Inspection report re Frontier Hard Chrome	9/16/76	1	G. Calkins and T. Kolby	Howard, Rich and files
00000064.	Site inspection reports	Inspection report re Frontier Hard Chrome	9/22/76	1	Calkins and Kolby, WDOE	Howard, Rich and files
00000065.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/13/77	1	Gerry Calkins, WDOE	Howard, Rich and files
00000066.	Site inspection reports	Inspection report re Frontier Hard Chrome	3/19/81	1	Morhous and Gregory, WDOE	Jim O., Eric, Brett, Howard and files
00000067.	Site inspection reports	Inspection report re FMC	6/7/82	1	Egbers and Steeley, WDOE	Dist. #4 and files
00000068.	Site inspection reports	Potential hazardous waste site - site inspection report	8/27/82	10	Thomas Tobin, EPA	
00000069.	Site inspection reports	Inspection report re Frontier Hard Chrome	3/31/82	1	Morhous and Egbers, WDOE	Howard, Dist. #4 and files
00000070.	Site inspection reports	Inspection report re Frontier Hard Chrome	4/28/82	1	Egbers and Steeley, WDOE	Dist. 4, Jim O., Jim K and files

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00000071.	Site inspection reports	Inspection report re FMC	6/7/82	1	Egbers and Steeley, WDOE	Dist. #4 and files
00000072.	Site inspection reports	Inspection report re Portco	6/7/82	1	Egbers and Steeley, WDOE	Dist. #4 and files
00000073.	Site inspection reports	Inspection report re State School for the Deaf	6/16/82	1	Egbers, WDOE	Dist. #4 and files
00000074.	Site inspection reports	Inspection report re Frontier Hard Chrome	3/10/83	1	Egbers and Steeley, WDOE	Dist. #4 and files
00000075.	Site inspection reports	Inspection report re Frontier Hard Chrome	4/17/84	1	Mike Blum, WDOE	File
00000076.	Site inspection reports	Inspection report re Frontier Hard Chrome	8/1/84	2	M. Blum and G. Stumpf, WDOE	File
00000077.	Site inspection reports	Inspection report re Frontier Hard Chrome	3/25/86	2	Mike Blum, WDOE	File
00000078.	Site inspection reports	Inspection report re Frontier Hard Chrome	6/24/86	1	Mike Gallagher, Bob Goodman, Sue Simms, WDOE	File
00000079.	Site inspection reports	Inspection report re Frontier Hard Chrome	7/2/86	1	Mike Gallagher, Ravi Krishnaiah, Sue Simms, WDOE	File
00000080.	Site inspection reports	Inspection report re Frontier Hard Chrome	8/6/86	2	Mike Gallagher, WDOE	File, Bob Goodman, WDOE
00000081.	Site inspection reports	Inspection report re Frontier Hard Chrome	12/11/86	2	Megan White, WDOE	File
00000082.	Site inspection reports	Inspection report re Frontier Hard Chrome	12/17-18/86	3	Mike Gallagher, WDOE	File
00000083.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/7/87	1	Mike Gallagher, WDOE	File
00000084.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/15/87	2	Mike Gallagher, Dave Rountry, Sue Simms, WDOE	File
00000085.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/20-21/87	1	Sue Simms, WDOE	File

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00000086.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/28/87	1	Sue Simms, WDOE	File
00000087.	Site inspection reports	Inspection report re Frontier Hard Chrome	1/29/87	1	Mike Gallagher, WDOE	File
00000088.	Site inspection reports	Inspection report re Frontier Hard Chrome	2/9-12/87	4	Sue Simms, WDOE	File
00000089.	Site inspection reports	Inspection report re Frontier Hard Chrome	2/10-20/87	2	Sue Simms, WDOE	File
00000090.	Site inspection reports	Inspection report re Frontier Hard Chrome	2/18-19/87	2	Mike Gallagher, WDOE	File
00000091.	Site inspection reports	Inspection report re Frontier Hard Chrome	6/2-3/87	2	Sue Simms, WDOE	File
00000092.	Action memorandum	Action memo re request for approval to proceed with RI/FS	1/30/84	5	Charles R. Findley, EPA	Ernesta B. Barnes, EPA
00000093.	Remedial Investigation/Feasibility Study correspondence	Letter re potential conflict of interest	12/12/84	1	J. Michael Blackwell, Dames & Moore	Rick Hall, WDOE
00000094.	Remedial Investigation/Feasibility Study correspondence	Memo re interim evaluation of performance by Dames & Moore	2/5/85		Bob Goodman, WDOE	File
00000095.	Remedial Investigation/Feasibility Study correspondence	Letter re reconnaissance of Frontier Hard Chrome site	5/1/85	4	Kenneth Trotman, Dames & Moore	Bob Goodman, WDOE
00000096.	Remedial Investigation/Feasibility Study correspondence	Letter re concern over schedule slippage on RI/FS	5/14/85	1	Charles Findley, EPA	Lynda L. Brothers, WDOE
00000097.	Remedial Investigation/Feasibility Study correspondence	Memo re performance problems with Dames & Moore	9/21/85	2	Rick Hall, WDOE	Lynda Brothers, WDOE
00000098.	Remedial Investigation/Feasibility Study correspondence	Letter re performance problems with Dames & Moore	5/21/85	2	Lynda L. Brothers, WDOE	J. M. Blackwell, Dames & Moore
00000099.	Remedial Investigation/Feasibility Study correspondence	Letter re performance problems with Dames & Moore	5/28/85	1	Lynda L. Brothers, WDOE	Charles Findley, EPA

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00000100.	Remedial Investigation/Feasibility Study correspondence	Memo re pre-drilling meeting on-site with Dames & Moore	7/30/85	3	Megan White, WDOE	File
00000101.	Remedial Investigation/Feasibility Study correspondence	Letter re description of activities of Washington DOE in vicinity of Jantzen plant	10/14/85	1	Bob Goodman, WDOE	Dick Sigmon, Jantzen, Inc.
00000102.	Remedial Investigation/Feasibility Study correspondence	Letter with attached agenda, summary table and diagram re additional data requirements necessary to complete RI as discussed at meeting of 4/22/86	5/1/86	5	Kathryn M. Lombardo, Dames & Moore	Bob Goodman, WDOE
00000103.	Remedial Investigation/Feasibility Study correspondence	Letter re confirmation of discussions between EPA and WDOE re tasks to be performed by WDOE in completion of RI/FS	7/9/86	2	Norma Lewis, EPA	Robert Goodman, WDOE
00000104.	Remedial Investigation/Feasibility Study correspondence	Letter re additional information re site activities requested earlier	10/27/86	2	David Rountry, WDOE	Phil Wong, EPA
00000105.	Remedial Investigation/Feasibility Study correspondence	Letter re status and revisions of RI activities and amendment to multi-site cooperative agreement	11/3/86	2	David Rountry, WDOE	Phil Wong, EPA
00000106.	Remedial Investigation/Feasibility Study correspondence	Letter re discharge of pump test water to sanitary sewer. Attached table re water quality results from deep aquifer near proposed pump test well over time	11/19/86	3	Megan White, WDOE	Tom Royer, City of Vancouver
00000107.	Remedial Investigation/Feasibility Study correspondence	Memo re possible implementation of Expedited Remedial Action	12/18/86	2	Phillip M. Wong, EPA	Phillip Millam, EPA
00000108.	Remedial Investigation/Feasibility Study correspondence	Letter re formal response to Superfund comprehensive accomplishment plan proposal	12/23/86	2	Jerry Jewett, WDOE	Jim Everts, EPA
00000109.	Remedial Investigation/Feasibility Study correspondence	Memo re meeting with EPA to discuss Expedited Remedial Action strategy	12/24/86	2	Dave Rountry, WDOE	File
00000110.	Remedial Investigation/Feasibility Study correspondence	Letter re confirmation of discussions re proposed implementation of Expedited Remedial Action	1/21/87	1	James Everts, EPA	Jerry Jewett, WDOE

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00000111.	Remedial Investigation/Feasibility Study correspondence	Letter re Washington DOE's decision not to participate in expedited remedial action	2/13/87	2	Jerry Jewett, WDOE	James Everts, EPA
00000112.	Remedial Investigation/Feasibility Study correspondence	Letter re progress on RI/FS	2/24/87	1	Phillip G. Millam, EPA	Jerry Jewett, WDOE
00000113.	Remedial Investigation/Feasibility Study correspondence	Letter re Expedited Remedial Action, ROD target date, FS workplan and multi-site cooperative agreement amendment application	3/11/87	2	Jerry Jewett, WDOE	Phillip G. Millam, EPA
00000114.	Remedial Investigation/Feasibility Study correspondence	Letter re disposal of drill cuttings obtained during well installation at Circle Land Fill	4/13/87	1	Megan White, WDOE	Gary Bickett, SW Washington Health District
00000115.	Remedial Investigation/Feasibility Study correspondence	Letter approving disposal of drill cuttings at Circle C landfill	4/28/87	1	Gary Bickett, SW Washington Health District	Megan White, WDOE
00000116.	Remedial Investigation/Feasibility Study correspondence	Letter re: surface water as exposure pathway in feasibility study report	5/4/87	1	Dave Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000117.	Remedial Investigation/Feasibility Study correspondence	Letter re plans by City of Vancouver to install storm drainage system around Frontier Hard Chrome site	5/5/87	1	David Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000118.	Remedial Investigation/Feasibility Study correspondence	Letter notifying Dames & Moore and Washington DOE of Bovay's concern re delivery date for preliminary draft of feasibility study	7/1/87	2	Robert E. Smith, Bovay Northwest, Inc.	Kevin Freeman, Dames & Moore
00000119.	Remedial Investigation/Feasibility Study correspondence	Letter and attached memo re approach for handling organic groundwater contamination in feasibility study	7/7/87	3	David Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000120.	Remedial Investigation/Feasibility Study correspondence	Letter re schedule information on delays in delivery of draft feasibility study report	7/13/87	2	David Rountry, WDOE	Phil Wong, EPA
00000121.	Remedial Investigation/Feasibility Study correspondence	Memo re interim progress report on feasibility study	7/28/87	1	David Rountry, WDOE	File

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00000122.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Meeting minutes re technical and management review of Remedial Investigation with attached map of proposed monitoring well locations	6/27/85	4	---	---
00000123.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Agenda and list of deliverables for project status report meeting, Washington DOE uncontrolled hazardous waste sites, Frontier Hard Chrome	9/19/85	2	---	---
00000124.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Meeting minutes of technical and management review of remedial investigation	9/20/85	2	---	
00000125.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Meeting minutes re technical and management review of remedial investigation and handwritten notes re lab results from testing of samples for chrome	11/25/85	5	---	
00000126.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Memo re meeting to discuss remedial investigation data gaps	5/9/86	2	Megan White, WDOE	File
00000127.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Memo re conference call held to discuss soil sampling inside and outside of building at site	6/23/86	2	Megan White, WDOE	File
00000128.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Memo re meeting to discuss schedule commitment, explanation of future work activity and explanation of results of past work activity	6/24/86	3	Norma Lewis, EPA	File
00000129.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Handwritten notes re Frontier Hard Chrome meeting - Washington DOE. Olympia	9/3/86	3	---	---
00000130.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Memo re conference call to discuss proposed Expedited Remedial Investigation	2/5/87	1	Phil Wong	File

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00000131.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Meeting minutes re feasibility study	5/26/87	4	---	---
00000132.	Remedial Investigation/Feasibility Study meetings between state, EPA and contractor	Memo, meeting notes and agenda feasibility study tasks numbers 3 and 5	5/27/87	6	Dave Rountry, WDOE	Megan White and Mike Gallagher, WDOE
00000133.	Wells: water level measurements	Transmittal sheet and summary of water levels, 11/4/85 through 5/2/86	6/16/85	2	Kathryn M. Lombardo, Dames & Moore	Mike Gallagher, WDOE
00000330.	Wells: water level measurements	Groundwater elevations table - Round 1	6/24/86	2		
00000134.	Wells: water level measurements	Memo re water level measurements taken on 6/24/86	6/26/86	2	Mike Gallagher, WDOE	File
00000135.	Wells: water level measurements	Transmittal sheet and water level measurement form	7/2/86	3	Kathryn M. Lombardo, Dames & Moore	Mike Gallagher, WDOE
00000136.	Wells: water level measurements	Ground water elevations table - Round 2	7/2/86	2	---	
00000137.	Wells: water level measurements	Ground water elevations table - Round 3	7/8/86	2	---	
00000138.	Wells: water level measurements	Memo re water level measurements taken 6/24/86 (Round 1)	7/14/86	2	Mike Gallagher, WDOE	File
00000139.	Wells: water level measurements	Memo re water level measurements taken 7/2/86 (Round 2)	7/14/86	2	Mike Gallagher, WDOE	File
00000140.	Wells: water level measurements	Memo re water level measurements taken 7/8/86 (Round 3)	7/17/86	2	Mike Gallagher, WDOE	File
00000141.	Wells: water level measurements	Ground water elevations table - Round 4	7/24/86	2	---	---
00000142.	Wells: water level measurements	Memo re water level measurements taken 7/24/86 (Round 4)	7/29/86	2	Mike Gallagher, WDOE	File

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00000143.	Wells: water level measurements	Ground water elevations table - Round 5	8/6/86	2	---	---
00000144.	Wells: water level measurements	Memo re water level measurements taken 8/6/86 (Round 5)	8/11/86	2	Mike Gallagher, WDOE	File
00000145.	Wells: water level measurements	Ground water elevations table - Round 6	9/18/86	2	---	---
00000146.	Wells: water level measurements	Memo re water level measurements taken 9/18/86 (Round 6)	10/13/86	2	Mike Gallagher, WDOE	File
00000147.	Wells: water level measurements	Summary of water level elevations	---	1	Washington DOE	-
00000148.	Sampling plans, technical standards and monitoring wells	Letter re water sample from industrial well at FMC plant in Vancouver, Washington	8/14/84	1	Mike Blum, WDOE	Gabe Nahigian, FMC Corp.
00000149.	Sampling plans, technical standards and monitoring wells	Memo and specification sheets re testing device for field testing of hexavalent chromium	1/31/85	3	Harlan Borow, Dames & Moore	Greg Glass, Dames & Moore
00000150.	Sampling plans, technical standards and monitoring wells	Memo, map, field survey form and chain of custody record re ground water sampling of existing wells in vicinity of Frontier Hard Chrome	6/18/85	8	Ken Trotman, Dames & Moore	SMT, Dames & Moore
00000151.	Sampling plans, technical standards and monitoring wells	Memo re sampling of existing wells around Frontier Hard Chromium on 6/19/85	6/26/85	2	Megan White, Washington DOE	File
00000152.	Sampling plans, technical standards and monitoring wells	Letter, field parameters table and handwritten notes re initial sampling on 6/19/85 of existing wells in vicinity of Frontier Hard Chrome	6/27/85	6	Kenneth N. Trotman, Dames & Moore	Bob Goodman, WDOE
00000153.	Sampling plans, technical standards and monitoring wells	Memo and two well completion diagrams re submittal of variance for installation of monitoring wells by Dames & Moore at Frontier Hard Chrome site	8/16/85	4	Mike Gallagher, WDOE	Bill Miller, WDOE

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00000154.	Sampling plans, technical standards and monitoring wells	Memo granting variance for installation of monitoring wells by Dames & Moore at Frontier Hard Chrome site	8/20/85	1	Bill Miller, WDOE	Mike Gallagher OE
00000155.	Sampling plans, technical standards and monitoring wells	Handwritten memo re Field Change Order #1 at Frontier Hard Chrome remedial investigation	10/15/85	2	Mike Gallagher, WDOE	Joanne Chance
00000156.	Sampling plans, technical standards and monitoring wells	Memo re sampling of water puddle outside Cox Cable Co., Vancouver, WA	12/23/85	1	Megan White, WDOE	File
00000157.	Sampling plans, technical standards and monitoring wells	Letter re abandonment of monitoring well B85-2 at Frontier Hard Chrome	1/2/86	1	Michael J. Gallagher, WDOE	Kathy Lombardo, Dames & Moore
00000158.	Sampling plans, technical standards and monitoring wells	Memo re Frontier Hard Chrome Data Review	6/6/86	1	Renee Fuentes, EPA	Norma Lewis, EPA
00000159.	Sampling plans, technical standards and monitoring wells	Untitled diagrams re sampling wells		9		
00000160.	Sampling plans, technical standards and monitoring wells	Handwritten memo re analysis of soil and groundwater samples	9/5/86	1	Megan White, WDOE	FHC Team
00000161.	Sampling plans, technical standards and monitoring wells	Memo and description of procedure re chromium desorption isotherm procedure for Frontier Hard Chrome site	9/23/86	3	Hannah Pavlik, Dames & Moore	Kathy Lombardo, Dames & Moore
00000162.	Sampling plans, technical standards and monitoring wells	Handwritten memo re volatile or: analyses at Frontier Hard Chrome	9/24/86	3	Megan White, WDOE	FHC Team
00000163.	Sampling plans, technical standards and monitoring wells	Memo re standards for chemicals of concern at Frontier Hard Chrome	10/3/86	1	Megan White, WDOE	Dave Rountry, WDOE
00000164.	Sampling plans, technical standards and monitoring wells	Handwritten memo re prioritizing of wells and soil boring for sampling purposes	10/14/86	2	Megan White, WDOE	Dave Rountry, WDOE

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00000165.	Sampling plans, technical standards and monitoring wells	Memo and schematic "shallow" monitoring well completion diagram re submittal of variance for installation of monitoring wells by Dames & Moore/Hokkaido Drilling & Development Corp. at Frontier Hard Chrome site	12/15/86	2	Mike Gallagher, WDOE	Bill Miller, WDOE
00000166.	Sampling plans, technical standards and monitoring wells	Letter re Frontier Hard Chrome site pump test discharges	12/12/86	3	Thomas D. Boyer, City of Vancouver	Megan White, WDOE
00000167.	Sampling plans, technical standards and monitoring wells	Memo granting variance for installation of monitored wells by Dames & Moore/Hokkaido Drilling & Development Corp. at Frontier Hard Chrome site	1/5/87	1	Bill Miller, WDOE	Mike Gallagher, WDOE
00000168.	Sampling plans, technical standards and monitoring wells	Handwritten note re drilling and possible abandonment of pump test well	1/28/87	2	---	Dave/Mike
00000169.	Sampling plans, technical standards and monitoring wells	Handwritten memo re injection well and water rights permit at Frontier Hard Chrome site	7/2/87	1	Megan White, WDOE	File
00000170.	Sampling plans, technical standards and monitoring wells	Handwritten notes re volume of drill cuttings calculated in number of drums	---	3	---	
00000171.	City of Vancouver's sewer system	Memo re Frontier Hard Chrome waste water discharge	2/17/87	1	Jon Neel, WDOE	David Rountry, WDOE
00000172.	City of Vancouver's sewer system	Memo re conversation with Vic Ehrich, City of Vancouver, on conversion of sanitary sewer to storm drain	5/1/87	1	Megan White, WDOE	File
00000173.	City of Vancouver's sewer system	Letter re Frontier Hard Chrome site and sewer constructions	6/26/87	2	Donald L. Skaggs, City of Vancouver, WA	David Rountry, WDOE
00000174.	City of Vancouver's sewer system	Cover letter with attached WDOE response to city sewer proposal	7/14/87	3	Kevin G. Lakey, Dames & Moore	David Rountry, WDOE

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000175.	City of Vancouver's sewer system	Letter re city's planning efforts for storm water drainage project near the Frontier Hard Chrome Superfund site	7/28/87	3	David Rountry, WDOE	Don Skaggs, City of Vancouver, WA
00000176.	City of Vancouver's sewer system	Letter re Frontier Hard Chrome site and sewer construction. Attached sample results and map showing location of two sampling sites	8/18/87	3	Donald L. Skaggs, City of Vancouver, WA	David Rountry, WDOE
00000177.	City of Vancouver's sewer system	Preliminary City of Vancouver, WA, Proposal and Specifications for Sanitary Sewer Construction, East First and Y Streets	8/87	28	City of Vancouver, WA	
00000178.	Quality assurance project plan (QAPP)	Quality assurance project plan, Frontier Hard Chrome, Vancouver, Washington, for the Washington State Department of Ecology	7/12/85	95	Dames & Moore	WDOE
00000179.	Quality assurance project plan	Revisions for the QAPP, Frontier Hard Chrome	No date	2	Author unknown	
00000180.	Work plans: remedial investigation	Memo re RI/FS. Attached WDOE Statement of Work and Appendix regarding possible consultant tasks for RI	10/5/84	15	Duane R. Goodman, WDOE	WDOE contractor for RI/FS
00000181.	Work plans: remedial investigation	Remedial Investigation Initial Work Plan. Attached map of Frontier Hard Chrome vicinity showing known existing wells and generalized geographic area of interest for remedial investigation	1/15/85	27	Dames & Moore prepared for WDOE	
00000182.	Work plans: remedial investigation	Remedial Investigation Work Plan	7/12/85	36	Dames & Moore, prepared for the WDOE	
00000183.	Work plans: remedial investigation	Remedial Investigation Work Plan, Phase 2	11/17/86	57	Dames & Moore, prepared for the WDOE	

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organi
00000165.	Sampling plans, technical standards and monitoring wells	Memo and schematic "shallow" monitoring well completion diagram re submittal of variance for installation of monitoring wells by Dames & Moore/Hokkaido Drilling & Development Corp. at Frontier Hard Chrome site	12/16/86	2	Mike Gallagher, WDOE	Bill Miller, WDOE
00000166.	Sampling plans, technical standards and monitoring wells	Letter re Frontier Hard Chrome site pump test discharges	12/12/86	3	Thomas D. Boyer, City of Vancouver	Megan White, WDOE
00000167.	Sampling plans, technical standards and monitoring wells	Memo granting variance for installation of monitored wells by Dames & Moore/Hokkaido Drilling & Development Corp. at Frontier Hard Chrome site	1/5/87	1	Bill Miller, WDOE	Mike Gallagher, WDOE
00000168.	Sampling plans, technical standards and monitoring wells	Handwritten note re drilling and possible abandonment of pump test well	1/28/87	2	---	Dave/Mike
00000169.	Sampling plans, technical standards and monitoring wells	Handwritten memo re injection well and water rights permit at Frontier Hard Chrome site	7/2/87	1	Megan White, WDOE	File
00000170.	Sampling plans, technical standards and monitoring wells	Handwritten notes re volume of drill cuttings calculated in number of drums	---	3	---	
00000171.	City of Vancouver's sewer system	Memo re Frontier Hard Chrome waste water discharge	2/17/87	1	Jon Neel, WDOE	David Rountry, WDOE
00000172.	City of Vancouver's sewer system	Memo re conversation with Vic Ehrich, City of Vancouver, on conversion of sanitary sewer to storm drain	5/1/87	1	Megan White, WDOE	File
00000173.	City of Vancouver's sewer system	Letter re Frontier Hard Chrome site and sewer constructions	6/26/87	2	Donald L. Skaggs, City of Vancouver, WA	David Rountry, WDOE
00000174.	City of Vancouver's sewer system	Cover letter with attached WDOE response to city sewer proposal	7/14/87	3	Kevin G. Lakey, Dames & Moore	David Rountry, WDOE

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00000184.	Remedial investigation drafts & comments	Agenda meeting - WDOE. Attached stratography, geologic cross-sections, water level contour maps, laboratory analysis, boring logs and drum inventory	11/25/85	50		
00000185.	Remedial investigation drafts & comments	Letter re the draft Phase I remedial investigation	5/12/86	1	Megan White, WDOE	Kathy Lombardo, Dames & Moore
00000186.	Remedial investigation drafts & comments	Memo re comments on draft Remedial Investigation Report, Phase I, by Dames & Moore	10/28/86	5	Mike Gallagher, WDOE	Dave Rountry, WDOE
00000187.	Remedial investigation drafts & comments	Memo re comments on Phase I RI prepared by Dames & Moore, dated October, 1986	11/18/86	6	Megan White, WDOE	Dave Rountry, WDOE
00000188.	Remedial investigation drafts & comments	Memo re potential remedial technologies	3/23/87	2	Megan White, WDOE	Dave Rountry, WDOE
00000189.	Remedial investigation drafts & comments	Letter re need for additional items to include in the RI report	4/10/87	1	David Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000190.	Remedial investigation drafts & comments	Memo re comments on draft Remedial Investigation Report by Dames & Moore	7/11/87	6	Mike Gallagher, WDOE	Dave Rountry, WDOE
00000191.	Remedial investigation drafts & comments	Cover memo re draft RI report, Section 6, attached review comments from Megan White and Mike Gallagher	6/27/87	11	Dave Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000192.	Remedial investigation drafts & comments	Letter re final set of review comments for the RI draft report	7/14/87	3	Dave Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000193.	Remedial investigation drafts & comments	Expanded outline, Phase I - Remedial Investigation Report	No date	5	Author unknown	
00000194.	Remedial investigation drafts & comments	Remedial investigation, Frontier Hard Chrome, draft report, Vol. 1	5/87	282	Dames & Moore	
00000195.	Remedial investigation drafts & comments	Remedial investigation, Frontier Hard Chrome, draft report, Vol. 2	5/87	612	Dames & Moore	

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00000196.	Remedial investigation report, final	Remedial investigation, Frontier Hard Chrome, final report, Vol. 1	8/87	233	Dames & Moore	
00000197.	Remedial investigation report, final	Remedial investigation, Frontier Hard Chrome, Final report, Vol. 2	8/87	683	Dames & Moore	
00000198.	Workplans: feasibility study	Draft Identification of Preliminary Remedial Technologies	3/26/85	14	Bovay Northwest, Inc.	
00000199.	Workplans: feasibility study	Feasibility Study Workplan. Attached schedule.	10/2/86	13	Bovay Northwest, Inc., prepared for WDOE	
00000200.	Workplans: feasibility study	Final Workplan Feasibility Study	3/19/87	48	Dames & Moore, prepared for WDOE	
00000201.	Feasibility study, drafts and comments	Feasibility Study, Frontier Hard Chrome, draft report, Vol. 1	7/87	412	Bovay Northwest, Inc., prepared for Dames & Moore	
00000202.	Feasibility study, drafts and comments	Feasibility Study, Frontier Hard Chrome, draft report, Vol. 2	7/87	327	Bovay Northwest, Inc., prepared for Dames & Moore	
00000203.	Feasibility study, drafts and comments	Frontier Hard Chrome Feasibility Study, Process Network. Document is located in WDOE - Hazardous Waste Cleanup Program file	4/22/87 Revision 1 5/1/87	Unknown	Dames & Moore	
00000204.	Feasibility study, drafts and comments	Memo re comments on FS tasks 3 and 5 prepared by Bovay Engineers for the FHC site dated 5/15/87	5/28/87	3	Megan White, WDOE	Dave Rountry, [illegible]
00000205.	Feasibility study, drafts and comments	Letter presenting compilation of ecology review comments re Feasibility Study draft Tasks 3 and 5. Attached revised Statement of Work	6/4/87	5	David Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
00000206.	Feasibility study, drafts and comments	Cover memo re preliminary review of attached FS Chapter 2. Attached comments re Task 2 - Identification and Screening of Remedial Technologies	6/18/87	56	Dave Rountry, WDOE	Gretchen Greenawalt, Dames & Moore

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0207.	Feasibility study, drafts and comments	Cover memo re attached Table 2-3, Remedial Technology Screening Summary and review comments	6/25/87	7	Dave Rountry, WDOE	Gretchen Greenawalt, Dames & Moore
0208.	Feasibility study, drafts and comments	Handwritten comments on PHC draft FS dated July, 1987	8/14/87	41	Megan White, WDOE	Dave Rountry, WDOE
0209.	Lab reports/raw data	Report re analysis for total chrome and hexavalent chrome, log #A850610-B	6/18/85	1	Susan M. Coffey, Coffey Laboratories, Inc.	City of Vancouver
0210.	Lab reports/raw data	Report on water sample analysis, laboratory #90292	6/28/85	4	J. M. Owens, Laucks Testing Laboratories, Inc.	Ken Trotman, Dames & Moore
0211.	Lab reports/raw data	Report re analysis for total chromium and hexavalent chromium, Log #A851010-C	10/23/85	1	Susan M. Coffey, Coffey Laboratories, Inc.	City of Vancouver
0212.	Lab reports/raw data	Cover letter re attached priority pollutant analyses of ground water obtained from WB5-1A	12/4/85	10	Kathryn M. Lombardo, Dames & Moore	Robert Goodman, WDOE
0213.	Lab reports/raw data	Transmittal sheet re attached table showing remaining portions of soil samples, archived at Laucks Laboratory	12/6/85	2	Kathryn M. Lombardo, Dames & Moore	Bob Goodman, WDOE
0214.	Lab reports/raw data	Handwritten report relayed by phone re total chromium and hexavalent chromium	12/13/85	2	Author unknown	
0215.	Lab reports/raw data	Handwritten note re sample results relayed by phone	12/26/85	1	Megan White, WDOE	Bob Goodman, WDOE
0216.	Lab reports/raw data	Letter re attached analytical results for samples collected from two Cox Cable drinking water fountains and two surface samples	1/16/86	2	Kathryn M. Lombardo, Dame Moore	Megan White, WDOE
0217.	Lab reports/raw data	Report re analysis for chromium and hexavalent chromium, Log #A860124-E	1/26/86	1	Susan M. Coffey, Coffey Laboratories, Inc.	Larry Gruber, City of Vancouver

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00000218.	Lab reports/raw data	Report re analysis for chromium and hexavalent chromium, Log #A861210-B	1/26/86	1	Susan M. Coffey, Coffey Laboratories, Inc.	Larry Gruber, City of Vancouver
00000219.	Lab reports/raw data	Report re analysis for chromium and hexavalent chromium, Log #A860127-B	1/29/86		Susan M. Coffey, Coffey Laboratories, Inc.	Larry Gruber, City of Vancouver
00000220.	Lab reports/raw data	Letter re attached analytical results of drinking water samples collected from Richardson Metal and IV Crafts on 1/27/86	2/6/86	3	Kathryn M. Lombardo, Dames & Moore	Bob Goodman, WDOE
00000221.	Lab reports/raw data	Report re Washington Inorganic Chemical analysis, Log #W860123-D	2/6/86	2	Coffey Laboratories, Inc.	Norm Kramm, City of Vancouver
00000222.	Lab reports/raw data	Draft summary of water analysis, basic water parameters, Round 2	4/86	3	Author unknown	
00000223.	Lab reports/raw data	Transmittal sheet with attached drum inventory for second ground water sampling event (1/6/86 - 1/15/86)	4/17/86	2	Kathryn M. Lombardo, Dames & Moore	Bob Goodman, WDOE
00000224.	Lab reports/raw data	Transmittal sheet re attached water level elevations obtained at three Cascade Tempering wells and analytical results of water samples collected on two occasions from CT-1	6/20/86	2	Kathryn M. Lombardo, Dames & Moore	Mark Adams, Applied Geotechnology
00000225.	Lab reports/raw data	Transmittal sheet re attached Round 3 - groundwater sampling: analytical results	8/14/86	6	Kathryn M. Lombardo, Dames & Moore	Mike Gallagher, WDOE
00000226.	Lab reports/raw data	Report on filters, wipes, soil and water, Laboratory #98139.	8/28/86	20	Barbara Gleason, Laucks Testing Laboratories, Inc.	Kathy Lombardo, Dames & Moore
00000227.	Lab reports/raw data	Lab analysis report re solids' total per cent. Attached environmental laboratory data summary of metals. Attached data report result qualifiers	1/16/87	4	EPA Region X lab	

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00000228.	Lab reports/raw data	Handwritten memo providing summary of analytical results of water samples obtained during 72-hour deep-aquifer pump-test	2/13/87	1	Dave Rountry, WDOE	Pat Basley, City of Vancouver
00000229.	Lab reports/raw data	Transmittal sheet re attached results of chemical analysis, Phase 2, remedial investigation, including tables and soil boring and well location maps and surface soil sample maps	4/29/87	41	Gretchen Greenawalt, Dames & Moore	Jack Madsen, Bovay Northwest, Inc.
00000230.	Lab reports/raw data	Chemical analysis report for soil samples	No date	2	Laucks Testing Laboratory	
00000231.	Lab reports/raw data	Summary of results, field screening for Cr6+	No date	1	Author unknown	
00000232.	Lab reports/raw data	Volatile organic parameters, water: Round 1	4/2/86	8	Author unknown	
00000233.	Lab reports/raw data	Volatile organic parameters, water: Round 2	No date	8	Author unknown	
00000234.	Lab reports/raw data	Summary of results, field screening for Cr6+	No date	1	Author unknown	
00000235.	Lab reports/raw data	Chemical analysis table for soil and water samples	No date	1	Laucks Testing Laboratory	
00000236.	Lab reports/raw data	Chemical analysis table for soil and water samples	No date	1	Laucks Testing Laboratory, Inc.	
00000237.	Lab reports/raw data	Volatile organic parameters, water: Round 3	No date	5	Author unknown	
00000238.	Maps, diagrams, photos	Maps re Division of Highways. Original maps located at WDOE Hazardous Waste Management files	No date	4	Washington State Department of Transportation	
00000239.	Maps, diagrams, photos	Preliminary plans for proposed East First Street and Y Street. Original maps located at WDOE, Hazardous Waste Management files	No date	1	Author unknown	

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00000240.	Maps, diagrams, photos	Preliminary maps and diagrams re East First Street and Y Street. Original maps located at WDOE Hazardous Waste Management files	6/87	4	City of Vancouver	
00000241.	Maps, diagrams, photos	Drawing re geologic formation. Original map located at WDOE Hazardous Waste Management file	No date	1	Author unknown	
00000242.	Maps, diagrams, photos	Map of Vancouver freeway to Sleret Avenue. Original map located at WDOE Hazardous Waste Management file	7/29/58	1	Washington State Highway Commission	
00000243.	Maps, diagrams, photos	Map re Clark County, Washington, northeast 1/4 section, 35 T 2 N, R1E W.M. Original map located at WDOE Hazardous Waste Management file	No date	1	Clark County Map Service, Clark County courthouse	
00000244.	Maps, diagrams, photos	Map of Vancouver freeway to Sleret Avenue. Original map located at WDOE Hazardous Waste Management file	7/29/58	1	Washington State Highway Commission	
00000245.	Maps, diagrams, photos	Diagram of sampling locations inside building. Original maps located at WDOE Hazardous Waste Management files.	No date	1	Dames & Moore	
00000246.	Maps, diagrams, photos	Diagram of sample results for total chromium (parts per million) in upper screened zone, First Round. Original map located at WDOE Hazardous Waste Management file	No date	1	Author unknown	
00000247.	Maps, diagrams, photos	Diagram of sample results for total chromium (parts per million) in lower screened zone (First Round). Original maps located at WDOE hazardous waste management file.	No date	1	Author unknown	

Doc. #	e	Type/Description	Date	# Pages	Author/Organization	Addressee/Organiza
00000248.	Maps, diagrams, photos	Diagram of sample results for hexavalent chromium (parts per million) in upper screened zone, First Round. Original maps located at WDOE Hazardous Waste Management files.	No date	1	Author unknown	
00000249.	Maps, diagrams, photos	Diagram for sample results for hexavalent chromium (p.p.m.) in lower screened zone, First Round. Original maps located at WDOE Hazardous Waste Management files,	No date	1	Author unknown	
00000250.	Maps, diagrams, photos	Well location map. Original map located at WDOE Hazardous Waste Management file.	No date	1	Author unknown	
00000251.	Maps, diagrams, photos	Diagram of well locations. Original maps located at WDOE Hazardous Waste Management files.	No date	1	Author unknown	
00000252.	Maps, diagrams, photos	Map re well locations. Original map located at WDOE Hazardous Waste Management files	No date	1	Author unknown	
00000253.	Maps, diagrams, photos	Diagram of geologic cross section, A-A' (viewing north), total chromium concentrations (p.p.m.). Original map located at WDOE Hazardous Waste Management Files.	No date	1	Dames & Moore	
00000254.	Maps, diagrams, photos	Diagram of geologic cross section A-A' (viewing north), hexavalent chromium concentrations (p.p.m.). Original maps located at WDOE Hazardous Waste Management files.	No date	1	Dames & Moore	
00000255.	Maps, diagrams, photos	Diagram of geologic cross section B-B' (viewing east), hexavalent chromium concentrations (p.p.m.). Original maps located at WDOE Hazardous Waste Management files.	No date	1	Dames & Moore	

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000256.	Maps, diagrams, photos	Diagram of geologic cross section A-A' (viewing north), total chromium concentrations (p.p.m.). Original map located at WDOE Hazardous Waste Management file.	No date	1	Dames & Moore	
00000257.	Maps, diagrams, photos	Diagram of geologic cross section A-A' (viewing north), hexavalent chromium concentrations (p.p.m.). Original map located at WDOE Hazardous Waste Management File.	No date	1	Dames & Moore	
00000258.	Maps, diagrams, photos	Diagram of geologic cross section B-B'(viewing east), hexavalent chromium concentrations (p.p.m.). Original map located at WDOE Hazardous Waste Management Files.	No date	1	Dames & Moore	
00000259.	Maps, diagrams, photos	Site map, Frontier Hard Chrome, with attached geologic cross sections	4/21/87	7	Dames & Moore	
00000260.	Maps, diagrams, photos	Summary of Frontier Hard Chrome photographs at WDOE site file	No date	2	WDOE	
00000261.	Maps, diagrams, photos	Aerial photographic analysis of Frontier Hard Chrome, Inc.	8/85	13	EPA	
00000262.	Community relations plans and public participation	Memo re meeting of March 30, 1984, to establish a community relations program for the Frontier Hard Chrome cooperative agreement	4/4/84	3	Carol Thompson, WDOE	File
00000263.	Community relations plans and public participation	Community relations plan for remedial investigation at Frontier Hard Chrome	6/84	19	Carol R. Thompson, WDOE	
00000264.	Community relations plans and public participation	Letter providing notice of public meeting to be held October 24, 1984, to explain remedial investigations. Attached fact sheet	10/16/84	3	Carol Thompson, Bob Goodman, WDOE	All interested citizens
000002	Community relations plans and public participation	Memo re October 24 public meeti	11/14/84	1	Carol Thompson, WDOE	File

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00000266.	Community relations plans and public participation	News release: Field Work at Frontier Hard Chrome to Begin	8/21/85	1	Washington DOE	
00000267.	Community relations plans and public participation	News release: Frontier Hard Chrome Update, December 5, 1986	12/5/86	1	Washington DOE	
00000268.	Community relations plans and public participation	Frontier Hard Chrome Community Relations Plan, Final Draft	7/22/87	22	Dames & Moore	
00000269.	Community relations plans and public participation	Mailing list, Frontier Hard Chrome	No date	2	Author unknown	
00000270.	Community relations plans and public participation	Remedial Action subcontract between Dames & Moore and Urban Regional Research, attachment 1, re community relations services	6/9/87	2	Kevin J. Freeman, Dames & Moore, and Jane Preuss, Urban Regional Research	
00000271.	Newspaper articles	A maze with no cheese; closed chrome firm blazed a long, hard paper trail	2/20/83	1	John Harrison, The Columbian	
00000272.	Newspaper articles	Firm owner objects to state pollution investigation	10/25/84	1	John Harrison, The Columbian	
00000273.	Newspaper articles	Chromium damage check starts	8/23/85	1	John Harrison, The Columbian	
00000274.	Newspaper articles	Hazardous-waste sites, Ecology Department lists ten of them in Clark County	1985	1	Bruce Westfall, The Columbian	
00000275.	Newspaper articles	Wells drilled in hazardous waste tests	No date	1	Ron Linde, The Oregonian	
00000276.	Newspaper articles	Wells dug to monitor pollution	[illegible]/87	2	Bruce Westfall, The Columbian	
00000277.	Consent for access	Letter re State of Washington vs. Frontier Hard Chrome, Inc. Attached request for entry upon land for inspection and other purposes	4/30/84	5	Charles K. Douthwaite, Office of the Attorney General	K. DeWitt Jones, Attorney at Law
00000278.	Consent for access	Letter re attached list of property owners in vicinity of Frontier Hard Chrome facility	7/9/85	4	Stephan M. Testa, Dames & Moore	Rob Goodman, WDOE

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00000279.	Consent for access	Handwritten consent for access to property to Washington DOE and their contractors	9/23/85		John Riser, Richardson Metal Work, Inc.	WDOE
00000280.	Consent for access	Consent for Access to Property to drill and install one monitoring well	12/9/86	1	Gerald N. Alexander	WDOE
00000281.	Consent for access	Consent for Access to Property to drill and install one monitoring well	12/22/86	1	Bill Krusinski, Washington School for the Deaf	WDOE
00000282.	Consent for access	Letter re access to Burgett property, Vancouver. Attached access agreement.	7/21/87	3	Kathleen D. Mix, Office of the Attorney General	Walter Clayton, Attorney at Law
00000283.	Consent for access	Access agreement to drill and install one, possibly two, monitoring wells	No date	1	Frank Mize and Bob Goodman, WDOE	WDOE
00000284.	Correspondence between State and PRP (after 1983)	Letter re State of Washington vs. Frontier Hard Chrome, Inc.	5/18/84	1	R. DeWitt Jones, Attorney at Law	Charles K. Douthwaite, Office of the Attorney General
00000285.	Correspondence between State and PRP (after 1983)	Letter re Walter Neth/Frontier Hard Chrome and the drilling of wells	11/16/84	2	Charles K. Douthwaite, Office of the Attorney General	R. DeWitt Jones, Attorney at Law
00000286.	Correspondence between State and PRP (after 1983)	Letter re Washington DOE investigation into contamination at Frontier Hard Chrome/Neth site	4/22/85	1	Charles K. Douthwaite, Office of the Attorney General	Mr. DeWitt Jones, Attorney at Law
00000287.	Correspondence between State and PRP (after 1983)	Letter re dry well on Neth site which had been sealed by cement cap	5/1/85		R. DeWitt Jones, Attorney at Law	Charles K. Douthwaite, Office of the Attorney General
00000288.	Correspondence between State and PRP (after 1983)	Letter indicating dry well was a a concrete sump	5/3/85	1	R. DeWitt Jones, Attorney at Law	Charles K. Douthwaite, Office of the Attorney General

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00000289.	Correspondence between State and PRP (after 1983)	Cover letter with attached letter re negative impact of National Priority Listing on property value at 113 "Y" Street, Vancouver, Washington	10/18/85	4	Walter Meth, Frontier Hard Chrome	Norma Lewis, EPA
00000290.	Correspondence between State and PRP (after 1983)	Letter re negative impact of national priorities listing on property value at 133 "Y" Street, Vancouver, Washington	10/18/85	3	Walter Meth and Otto Meth, Frontier Hard Chrome	Bob Goodman, WDOE
00000291.	Correspondence between State and PRP (after 1983)	Letter re Walter Meth's denial of access to Washington DOE contractors to investigate soil contamination. Attached schematic drawing of proposed soil sample locations	10/24/85	3	Charles R. Douthwaite, Office of the Attorney General	R. DeWitt Jones, Attorney at Law
00000294.	Correspondence between State and PRP (after 1983)	Letter requesting meeting with a representative of EPA to discuss burden on property by further testing and digging	11/8/85	2	Walter Meth, Frontier Hard Chrome	Bob Goodman, WDOE
00000295.	Correspondence between State and PRP (after 1983)	Letter in response to questions re the history of chrome plating facilities in the area	11/14/85	3	Walter Meth, Frontier Hard Chrome	Charles Findley, EPA
00000296.	Correspondence between State and PRP (after 1983)	Letter re hydrological studies in the area and ground water contamination	12/23/85	2	R. DeWitt Jones, Attorney at Law	Bob Goodman, WDOE
00000297.	Correspondence between State and PRP (after 1983)	Notice Letter to Frontier Hard Chrome re release or potential release of a hazardous substance	12/31/85	2	John D. Littler, WDOE	Otto Meth, Frontier Hard Chrome
00000298.	Correspondence between State and PRP (after 1983)	Letter requesting sample analysis reports	3/3/86	1	R. DeWitt Jones, Attorney at Law	Bob Goodman, WDOE
00000299.	Correspondence between State and PRP (after 1983)	Letter re impediment to lawful sale of property and sharing of date generated from sampling on site and consensual access to the Meth property	3/26/86	3	Kathleen D. Mix, Office of the Attorney General	R. DeWitt Jones, Attorney at Law

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000300.	Correspondence between State and PRP (after 1983)	Letter re property owners' cooperation with Washington DOE and the expiration of the consensual access agreement	4/7/86	3	R. DeWitt Jones, Attorney at Law	Kathleen D. Mix, Office of the Attorney General
00000301.	Correspondence between State and PRP (after 1983)	Letter summarizing meeting between property owners and representatives of the Department of Ecology and EPA and request for consent for access to property. Attached form for consent.	5/23/86	3	Kathleen D. Mix, Office of the Attorney General	DeWitt Jones, Attorney at Law
00000302.	Correspondence between State and PRP (after 1983)	Letter indicating tenants' consent for access to property for further testing with listing of conditions of entry	5/26/86	3	R. DeWitt Jones, Attorney at Law	Kathleen D. Mix, Office of the Attorney General
00000303.	Correspondence between State and PRP (after 1983)	Letter re consent for access to property and conditions proposed. Attached Consent for Access to Property form	5/30/86	3	Kathleen D. Mix, Office of the Attorney General	R. DeWitt Jones, Attorney at Law
00000304.	Correspondence between State and PRP (after 1983)	Letter re entry onto property and clarification of Condition D for entry	6/9/86	2	R. DeWitt Jones, Attorney at Law	Kathleen D. Mix, Office of the Attorney General
00000305.	State cooperative agreements	Cooperative agreement between the Washington Department of Ecology and the United States Environmental Protection Agency	1983	52	Washington DOE	EPA
00000306.	State cooperative agreements	EPA Assistance Agreement. Attached special conditions.	6/12/84	5	Frederick L. Meadows, EPA; Donald W. Moos, WDOE	
00000307.	State cooperative agreements	Letter re Frontier Hard Chrome cooperative agreement and special conditions	4/2/84	2	Lynda L. Brothers, WDOE	William N. Hedeman, EPA
00000308.	State cooperative agreements	Letter re special conditions included in the Cooperative Agreement	5/18/84	5	William Hedeman, EPA	Lynda Brothers, WDOE
00000309.	State cooperative agreements	Letter re acceptance of special conditions by EPA to the cooperative agreement	6/7/84	2	Lynda Brothers, WDOE	William N. Hedeman, EPA

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00000310.	State cooperative agreements	Letter re amendment request to cooperative agreement	12/17/85	2	Bob Goodman, WDOE	Kathy Davidson, EPA
00000311.	State cooperative agreements	Memo re amendments to the Washington multi-site agreement. Attached letter requesting amendments from WDOE.	12/31/85	4	Kathy Davidson, EPA	Oddvar K. Aurdal, EPA
00000312.	State cooperative agreements	EPA Assistance Amendment. Attached special conditions.	1/14/86	4	Charles Findley, EPA	Phillip Johnson, WDOE
00000313.	State cooperative agreements	Letter serving as a request for the transfer of funds within the multi-site cooperative agreement. Attached Federal Assistance Application form.	3/	4	John Littler, WDOE	Charles R. Findley, EPA
00000314.	State cooperative agreements	Special Conditions Cooperative agreement #V000283-01, Washington Multi-Site	3/86	7	EPA	
00000315.	State cooperative agreements	Letter re approval of request to amend Washington Multi-Site Cooperative Agreement. Attached amendment.	3/28/86	4	Charles R. Findley, EPA	John Littler, WDOE
00000316.	State cooperative agreements	Memorandum re request for reissuance of funds. Attached amendment and letter re approval of request to amend Washington Multi-Site Cooperative Agreement	4/4/86	3	Charles Findley, EPA	Russell H. Wyer, EPA
00000317.	State cooperative agreements	Special conditions re amendment application for Frontier Hard Chrome RI/FS project	7/24/86	4	EPA	
00000318.	State cooperative agreements	Memo re amendment to cooperative agreement #V-000283-01. Attached update of special conditions and June 27, 1986, request for an amendment to the Remedial Investigation Feasibility Project	8/7/86	8	Kathryn M. Davidson, EPA	Arv Aurdal, EPA

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000319.	State cooperative agreements	Letter re advance match amendment for RI/FS project. Attached EPA assistant amendment form and special conditions	8/18/86	10	Charles Findley, EPA	Philip Johnson, WDOE
00000320.	State cooperative agreements	Letter re status of RI activities, budget, and schedule	11/3/86	2	David Rountry, WDOE	Phil Wong, EPA
00000321.	State cooperative agreements	Letter re approval of transfer of funds among sites in the Multi-Site Cooperative Agreement. Attached amendment and special conditions.	12/31/86	4	Randall Smith for Charles Findley, EPA	Philip Johnson, WDOE
00000322.	State cooperative agreements	Letter re budget extension needs. Attached Multi-Site Cooperative Agreement Amendment Application.	4/10/87	2	Steve Hunter, WDOE	Phil Millam, EPA
00000323.	State cooperative agreements	Letter re review of amendment to Multi-Site Cooperative Agreement, V-000283-01-H. Attached letter re approved increase of funds. Attached Assistance Amendment conditions.	6/5/87	9	Steve Hunter, WDOE	EPA
00000324.	State cooperative agreements	Memo re proposed cooperative agreements with the State of Washington [illegible] the Frontier Hard Chrome site (V811652-01-0). Attached special conditions	No date	6	Lee M. Thomas, EPA	Frederick L. Meadows, EPA
00000325.	Telephone conversation records	Handwritten report re call from George Bullitt of Cox Cable concerning chromium poisoning of employees	11/22/85	2	Megan White, WDOE	
00000326.	Reference materials or listings of guidance documents used	Guidances for administrative records	No date	2	EPA	
00000327.	Other documents	Frontier Hard Chrome Hazardous Waste Site Health and Safety Plan, final	4/24/85	42	Radian Corp., prepared for Dames & Moore	

Doc. #	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organi n
00000328.	Other documents	Uniform Hazardous Waste Manifest forms for Frontier Chrome Project	12/4/85	3	Mike Blum, WDOE	
00000329.	Other documents	Uniform Hazardous Waste Manifest form	6/5/87	2	Sue Simms, WDOE	
00000330.	Wells - water level measurements	Groundwater elevations table, Round 1	6/24/86	2		

DOCUMENTS DELETED FROM FRONTIER HARD CHROME ADMINISTRATIVE RECORD

Doc. #	File	Type/Description	Reason Removed
00000292.	Correspondence between State and PRP (after 1983)	Letter re Notice of Potential Liability for activities at Frontier Hard Chrome	Duplicate of Doc. #00000293
00000293.	Correspondence between State and PRP (after 1983)	Letter re Notice of Potential Liability for activities at Frontier Hard Chrome	Not relevant

APPENDIX A.1

CITY OF VANCOUVER, WASHINGTON
City Hall 210 East 13th St - P O Box 1995
Vancouver, Washington 98668-1995

RECEIVED
NOV 16 1987
ECOLOGY-HW

November 5, 1987

Dave Rountry
Washington Department of Ecology
Mail Stop PV-11, Woodland Square
Olympia, Washington 98504-8711

Subject: Frontier Hard Chrome
Superfund Clean-up Proposals

Dear Mr. Rountry:

After reviewing the Remedial Investigation and Feasibility Study Reports and attending DOE presentation of the material held November 4, 1987, the following comments are submitted for consideration and a matter of record:

1. Clean up action is necessary.
2. Clean up remedies should begin at the earliest possible time to:

    a) Eliminate further spread of contaminants and limit clean up costs.

    b) Remove the superfund contaminant problem as an obstacle to economic development.

3. All highly contaminated soil (>550 ppm) should be either removed or stabilized, but in either case the pit should be refilled in a manner that results in a compacted and strong base to carry normal surface loads and satisfy building foundation needs.

4. The cap for the pit area should be an impermeable surface and the adjacent parking and roadways should be paved along with the installation of a storm drainage system to collect all surface water in the immediate area of 1st and Y Street and pipe the water away to an acceptable discharge point.

5. Water treatment effort appears necessary only to a limited extent. Treatment should be given to the water currently resting on top of the perched aquifer below the dry well area that is highly contaminated and is exhibiting a yellow color. This limited treatment work could be geared to allow discharge of this water into the sanitary sewer.

6. The city is strongly opposed to any water being injected into Aquifer B. This Aquifer B is near drinking water standards in much of the plume area. Disposal of treated effluent could only act to further degrade water quality. In such an injection option a malfunction of the treatment device could result in highly contaminated effluent being injected in a currently uncontaminated area of Aquifer B. To even allow such a possibility is comparable to allowing a water system cross-connection.

I wish to thank you for the effort given to correct this problem in our community. I also wish to make my staff available to assist with your final design elements, particularly with regard to the paving and storm drainage considerations. Please contact me at (206) 696-8187, or scan 559-8187, should you have any questions.

Sincerely,

John Ostrowski

JOHN OSTROWSKI, P.E.
Director of Public Works

APPENDIX B

FRONTIER HARD CHROME
PUBLIC HEARING

DATE TAKEN: November 4, 1987

TIME: 7:00 p.m.

PLACE: 605 North Devine Road
Vancouver, Washington

COURT REPORTER: TERESA RIDER FOSTER, RPR

RIDER & ASSOCIATES
COURT REPORTERS
P.O. Box 245
Vancouver, Washington 98666

APPEARANCES

FOR THE DEPARTMENT OF ECOLOGY:	MS. LYNN BERNSTEIN MR. DAVE ROUNTRY MR. MIKE GALLAGHER MS. CAROL FLESKES MS. MEGAN WHITE MS. PERRIN KAPLAN
FOR THE EPA:	MR. TIM BRINCEFIELD MR. PHILIP WONG
ALSO PRESENT:	MR. BOB SMITH, Engineer Bovay Northwest, Inc. MR. KEVIN FREEMAN MS. JEANNE LAWSON Dames & Moore

RECEIVED
NOV 13 1987
ECOLOGY-HW

MS. BERNSTEIN: Good evening, I'd like to start the meeting now. I'm Lynn Bernstein from the Department of Ecology, and on behalf of the Department of Ecology I'd like to welcome you to the meeting of Frontier Hard Chrome.

We're going to explain several things tonight and we're going to begin with explaining the Superfund process and how it applies to the Hard Chrome facility. Also we'll be explaining the remedial investigation, and we'll be presenting the alternatives to correct the problems at the site. We will also be answering your questions, which we encourage, and we'd like to receive your comments on the alternatives presented here tonight.

I hope everybody's received the packet that we had out on the front table. If you haven't, please raise your hand and Jeanne will pass them out.

In the packet you'll find a fact sheet that will summarize most of what will be said here tonight.

The feasibility study and remedial investigation reports are also on the back table to be reviewed after the meeting. Please note there is also a time schedule and agenda in the packet. And it's a general guideline that is flexible to respond to the progress of the meeting.

There'll be a specific time to talk about preferred alternatives and to ask questions. We'd like to separate our clarifying questions first, and try and get those answered.

And then to make our comments after if more questions come up during the comment time feel free to ask them.

The entire meeting will be recorded by a court reporter, and there will be a transcript of the meeting when it's completed.

I would like to introduce the people here tonight who are involved in the project, and we have Ecology staff here who work as a team. I am Lynn Bernstein, and I do the community relation on the site. We have Carol Fleskes, who is a section head of our whole division for the industrial site section. We have Mike Gallagher, who's a hydrogeologist. We have Megan White who's our engineer. Ar we have Perrin Kaplan back there who's our public informati person. We have Dave Rountry, who's the manager of the project. And then from Dames & Moore, who's our consultant contractor, we have Jeanne Lawson, who's in the back of the room there who's our community relations specialist. And w have Kevin Freeman, the project manager of Dames & Moore. And from Bovay Northwest, we have Bob Smith, who's project manager for those folks. And from EPA we have Phil Wong, who's a project manager, who's been involved with us.

And at this point I'll turn it over to Dave Roun from Ecology.

MR. ROUNTRY: Thank you, Lynn. I'd like to welc you, and thank you for your attendance at the meeting tonight.

The purpose of my discussion is preliminary to give you a general background for the Superfund process as it applies to Superfund sites in general, and specifically to this Frontier Hard Chrome site; run down briefly what the steps of that process are so that you'll understand how we got to where we are today. Follow-up on this overview of the Superfund process with the a brief discussion of the Frontier Hard Chrome history of operation, itself, and give you a little better perspective of how we entered into the investigation and study phase for this project.

The Superfund process starts with what we call a preliminary assessment and site investigation. And these are introductory steps to the evaluation of the site to identify basically initial problems that may lead us to more studies. This provides us with a general base line of information from which we can evaluate if the site is a problem and deserves further consideration.

Depending on the results of these activities, the preliminary assessment and site investigation, we would move to nominate this site to the National Priorities List. This occurred for the Frontier Hard Chrome site, by applying a hazard ranking system, a general grading system to evaluate potential impacts of the site problems to public health or the environment. All sites are graded similarly, so that sites can be prioritized for government attention or for cleanup actions.

It's at this point in the Superfund process once a site has been nominated to the National Priorities List, that the potentially responsible party, that individual or individuals that is potentially identified as being responsible for the contamination, is invited to participate in the design of the remedial investigation.

If the potentially responsible party declines at that point, then the government would step in and conduct site characterization studies themselves, which is the purpose of the remedial investigation, to fully define and characterize the problem, the scope of contamination at the site.

Concluding these studies, we would move into a feasibility study mode. Once the site is fully characteriz there would be adequate information on which we could base some decision or approach for a remedial or a cleanup desig and selection of some remedial action for that site.

At the conclusion of the feasibility study, which is the stage of the process that we are at now, we would select a cleanup alternative. And of course the purpose f this public meeting is part of the public review and comme process with input from the public, Ecology will be in a position to make a recommendation to EPA with respect to w should be the preferred alternative; what cleanup measures should be taken at the site. As in most construction projects, the construction would be preceded by engineering and design. This is to fine tune the options, to identify very specific technologies, conduct any final testing and allow us us to proceed with the cleanup.

Cleanup, which is called remedial action. And this involves carry out of that cleanup. Ones the site has been cleaned to the satisfaction to meet the objectives, we would move into an operation and maintenance phase, and the purpose of this is to insure that the remedial action the cleanup measures taken at the site would, in fact, take care of the problems of contamination. That it would reduce impact to public health and the environment.

I'd like to move into a general discussion of the history of the Frontier site operations.

The site was the location of a chrome plating operation from the mid-1950's to 1983. There were two ownerships involved in this business during that time period. During the latter part of this the site ownership was called Frontier Hard Chrome. During the period of 1970 through 1976 waste or processed waste water from the chrome plating operation was discharged to the city waste water treatment plant It was sometime in 1975 when it was determined that the chromium content of that waste water was interfering with the biological processes of the waste water treatment, and it was decided that that could no longer continue.

The business operators approached the Department of Ecology at that time and requested a waste discharge permit that they could then release that processed waste water to a dry well on the site.

That dry well is basically a four foot in diameter concrete pipe which was inserted in the ground to a depth of approximately 10 to 12 feet.

The Department of Ecology did issue an interim typ of a pretreatment -- of a waste discharge permit to the operators. There was as condition of this permit, however, that required pretreatment or treatment of that waste wa prior to its discharge to the dry well. Plans and specifications were requested in order that a treatment system could be designed.

There were, during the time period of the interim permit, there were two extensions to allow, in order to al the business to continue operating in that they were having difficulty preparing engineering plans and specs for treatment.

There were extensions provided that would allow them to continue operation.

It was late in this time period, actually in 198

I believe, Department of Ecology sampled waste water that was being discharged directly to the dry well. The analysis of that showed that chromium contamination would have classified that waste as an extremely hazardous waste, as per the requirements of the Washington Dangerous Waste Regulations. It was approximately that same time water samples were removed, taken from the FMC Corporation facility very nearby the Columbia River, approximately a half a mile south, southwest of the Frontier Hard Chrome facility.

Water samples taken from those locations showed chromium concentrations in the range of approximately three times the drinking water standards.

At that point Ecology couldn't wait any longer for designs, plans and specs for a treatment system, and there were two regulatory orders issued to the facility, one required that they discontinue discharge to that dry well location, and secondly that they provide plans, a ground water investigation plan to monitor conditions in the immediate vicinity of the site to determine if, in fact, there had been any impacts as a result of releases or discharges to the dry well.

With the information gained during this process the hazard ranking system was applied, hazard scoring system was applied to the site. The site was assigned to the National Priorities List. It was in April, 1985 that we actually began remedial investigation or site characterization studies.

I'd like to point out, here, that this is a -- in this particular case Department of Ecology is acting as the lead. We are then called the site lead, as a state lead for this project and some other projects EPA directs the work. We, Ecology, are operating under a contract or a cooperative agreement, specifically with EPA, obtain funding from them ir order that we could procure a contractor to initiate the remedial investigation.

And at this point I'd like to turn the floor over to Kevin Freeman of Dames & Moore who will discuss the results of their remedial investigation studies.

MR. FREEMAN: Thank you, Dave.

As Dave pointed out, I'm going to be talking to yc about the remedial investigation phase of the RIFS procedure.

The purpose of a remedial investigation at a Superfund site is first and foremost to define the nature a extent of the contamination at the site. And another very important goal is to essentially provide sufficient level c information on the technical issues of the site to allow feasibility study of potential remedial options to occur, after the results of the remedial investigation are known.

So, when we start this process there's a couple things that we do. The first thing is that we try to agree we can't based on existing information to do a site history, to define what we know about processes that are occurring on site and waste management procedures to try to define what the problems may be from a contaminant standpoint.

At that point we are really trying to define how those contaminants could, through various pathways, enter the environment and how those pathways could lead to exposures to any local populous or sensitive environments in the area.

So, in order to do that we are really looking for the kind of pathways that could lead to human exposure, or to other kinds of environment exposures. The kind of pathways we're looking for essentially are the possibility that the contaminants have entered the ground water, whether that ground water is being used by anybody in the area, such that they could be exposed to the contaminants in the ground water, where the contaminants in any sense can become airborne, such that any local populous or workers could ingest the contaminants in the air, whether any of the contaminants are in local surface water bodies in sufficient quantities to be of concern, and whether, for two reasons, we look at whether the contaminants are in the soils at the site.

On one hand we're interested in whether any incidental, although very unlikely types of exposures could occur through people ingesting any surface soils, eating surface soils, particularly children, or whether -- and we consider that to be a reasonably low probability event. But more importantly from our standpoint in the soils in this project, we're also concerned about whether the soils, themselves, because of the nature of the contamination involved here, could serve as what we call a secondary source of contamination to the ground water. In other words, could the soils bind up these contaminants, and at a later date release those contaminants to the ground water.

So, those were the issues we were trying to ferret out in this study.

This is a site map, and sounds like some of you ar already quite familiar with the site, but just for those you who may not be.

The project site location Frontier Hard Chrome is marked on this map by the star. One of the things that was of concern were the locations of nearby wells, ground water use sources in the project area, and I'd like to point those out.

There was, as you've heard, there were wells at t FMC Corporation that were used for industrial purposes. There was -- and there is a well, an irrigation well at the Washington School for the Deaf. There were two Vancouver well fields in the near field to the site area. To the nor of the site was Vancouver Well Station No. 1, and here we see Vancouver Well Station No. 4.

So, the first thing we looked at was the distribution of these contaminants in surface soils. And what you see here is what's called a contour map, which shows the distribution of the contaminants, and this is chromium in the surface soils. Now, the contaminants we were looking for primarily were what we call inorganic contaminants. These are essentially the metals and of course in a chrome plating operation there's obviously chrome that is discharged in the waste water stream. And secondarily we were looking for the possibility of there being any lead or nickel contamination associated with the project, site activities.

Far and away the contaminant of concern ended up being chromium. The concentrations of the other potential inorganics or metals at the site weren't that significant. Chromium is the concern at that site.

And what you see here is a map of chromium contamination in surface soils at the site, primarily in the upper 18 inches of the soil profile.

You can see that there is -- this is the Frontier Hard Chrome building, with the dry well out front. What we found were high concentrations, the concentration here is in parts per million, so the numbers, I'm not sure whether you can read these numbers in the back, but essentially this say a hundred, a thousand up here, those are in parts per million. Chromium in parts per million in the surface so And you can see there's a high area around the front of the Frontier Hard Chrome building, and another high area out her in the bog area, and we think that there was a discharge lin that went out to that area at some time during facility operations, and so this shows you where the high areas are i terms of chromium concentrations on the site.

Try to keep this in mind when we discuss the potential remedial actions, because it's based on this information that we select remedial actions that are appropriate for the site.

We mentioned we were also looking at subsurface soils. This is a cross section through subsurface soil t the site. You can consider this to be a vertical slice through the soil profiles, through the soils that exist in the subsurface at the Frontier Hard Chrome site. What we s on this site is this shows several things, one we do have water, which isn't surprising in the Columbia River flood plain. We have water from about here on down, this is the water level. Up here we see perched ground water in the f zone. Perched ground water means something that sits on something that isn't part of the full ground water table. have some water sitting on top of what we call an acquitar that's a technical term that means a unit that doesn't transmit water vertically very easily, so water tends to move slowly through that unit. So it's not surprising to see some water sitting on top of it.

Below it we have a very complex system of soils, but we were able to identify an acquifer system or a water bearing system which had two distinctive transmissive zones in it or zones that would provide water at differing rates. We called them the Level A zone and the Level B zone. And what you see up here is the Level A zone, down here is the Level B zone. They're separated by a discontinuance soil environment which again has properties that make it difficult for water to pass.

What that tended to do on site, then, is essentially water that's coming vertically down, would tend to move very slowly vertically, here, and more quickly in a horizontal direction, until it could find a way down into this lower zone.

This stratigraphy, or this subsurface soil profile is very important in terms of understanding what the distribution of contaminants in the subsurface on site is and I'd like to show you that next graph for that.

This is a more detailed graph, and I recognize that you can't see all the numbers, here. What these vertical lines represent are well installations. This is a west to east cross-section across the site.

I'd like to point out to you this is the Frontier Hard Chrome building shown here. Over here is the dry wel location. And over here is the bog.

Now, you might ask why is the bog there, we mentioned this zone that didn't transmit water very readily, it congregates over here in the bog, so that's why the water can tend to pond over here.

So, you see here again the same stratigraphy we talked about earlier. The numbers that's it's difficult for you to read are chromium concentrations in the subsurface soils.

Is what we see are very high concentrations of chromium in this upper acquitard unit, this zone that doesn' transmit water very readily, it tended -- in here were s y particles and organic soil particles that tended to grab on to the chromium as it was deposited into the soils.

We have very high concentrations of chromium in this area. Upwards, in one case, here, the chromium concentrations are 17 thousand parts per million. So, ther is significant soil contamination in the subsurface.

We also looked at water, what were the effects of the disposal practices on ground water. We mentioned that there was a Level A acquifer zone, and a Level B acquifer zone. We wanted to look at what the effects in ground wat were in both of those zones.

This is the Level A zone, and again this is called a contour map. What this shows, what these lines represent -- internal to each one of these lines the concentrations are higher than the numbers shown on the line. So, for instance this is .05 parts per million here, from this line to this line the concentration of chromium increases from .05 parts per million to .1 part per million.

Now, the interesting point on this particular concentration diagram is we have very, very high concentrations, very high concentrations of chromium in ground water beneath the dry well and in the immediate area of the dry well here. The numbers here exceed one hundred parts per million in ground water. The drinking water standard is .05 parts per million. So, what that says to you is that we -- the ground water in the Level A acquifer underneath this site exceeds drinking water standard everywhere inside this outside line. This is high 14, here is the FMC well, here.

We mentioned a Level B acquifer zone, this is the deeper one. So, that was shallower ground water we saw before, down around 20 feet. This is a deeper zone around thirtyish feet. What we see here, a similar type of profile, but you'll notice that we don't have the same kind of high concentrations of chromium in ground water.

The major concentrations here, the highest concentration in this diagram is about .35 parts per million. So, there's a significant difference in concentration from the Level A acquifer, to the Level B acquifer. Remember in Level A we were looking at concentrations in excess of one hundred parts per million. But again, this is the .05 part per million contour line, and everywhere inside this line the Level B ground water exceeds drinking water standard.

So, what does all this mean? Well, from the remedial investigation standpoint I'll summarize this way. We did look, as I mentioned, we looked at air, the concentrations of chromium in air. We looked at the concentrations of chromium in a couple of spots in surface water that was ponded in the area. Those pathways for human exposure do not appear to be significant. There doesn't appear to be a high level of risk to the local people or workers based on surface soils in terms of breathing in the contaminants or in the surface waters from these contaminants. Surface water does tend to pond in this area and drain into that bog. And by the way, I should point ou if you want to take a look at the bog and whatnot, we do ha a bunch of air photos around here where you can take a look at some of these site features from the air. What is obvi is there is significant concentration of chromium, both in surface soils and in subsurface soils. And we have significant concentrations of chromium in ground water under the site.

Now, we are concerned about the concentrations in soil as they might lead to additional contamination to the ground water. And what you'll see is, if you remember, there was very high concentrations in the surface near that upper acquitard level on the Level A. We'll have to do something about that, we'll hear about that later. Remember, there's high concentrations at the level of that high acquitard. In the ground water, they exceed drinking water standards. So, we have to do something about that. We have to look at that and come up with remedial actions that address that. And those are the important parts of the work that we've done in terms of the remedial investigation.

And with that, I'd like to pass it on to Bob Smith of Bovay, to tell you how we're going to address those issues. Thank you.

MR. SMITH: Thanks, Kevin.

Again, my name is Bob Smith. I'm with Bovay Northwest, we're the engineering consultant to the feasibility study to Dames & Moore and the Department of Ecology.

And what I'd like to discuss this evening is the engineering feasibility study process. The purpose of a feasibility study process is to determine the most cost effective action that may be required at a hazardous waste site, for alternatives that meet the specific site objectives for that site, and in the case of Frontier Hard Chrome we talking about public health and protection of the environment.

The process begins by developing a list of potential alternatives, using technologies that address the contaminants on the site, that are specific for this particular site.

Then we screen that long list of alternatives base on their ability to reduce the contaminants, either their mobility, they're toxicity or their volume.

During this process we estimate the costs of the various alternatives, and we also use that in our screening process.

And at the end we end up with a handful of final alternatives that are the most cost effective and meet the objectives for that site and that really have application a Frontier Hard Chrome.

An important part of the feasibility study proces is to develop specific cleanup objectives for this -- for particular site. In the case of Frontier Hard Chrome we w looking at protection of public health and the environment protection from contaminants that would be found in the du and on site soils. We were looking at the inorganic contaminants, specifically the metals, in this case chromium, a little bit of lead and nickel. We were looking at protection from the organic contaminants, which are more commonly called solvents. I think I'm going to switch to this side. I think we have more people on that side.

We're looking at protection of the existing public water supplies, and potential future water supplies; protection of surface water, such as the Columbia River; protection from ingesting vegetation, say maybe blackberries that children or people might eat that grow on the site.

And an overall objective is prevention of further migration of contaminants, whether they be in the soil or in the ground water.

Part of the feasibility study process is completing an Endangerment Assessment. And an Endangerment Assessment, purpose of an Endangerment Assessment is to estimate the public health impacts that might occur from the contaminants that are on the site. For example if someone's drinking the ground water at a particular concentration, or if they're involved with the surface water, or if they're inhaling the soil, the dust, maybe ingesting some of the soils on the site, or possibly eating the vegetation, the blackberries and that type of thing that grow on the site.

The Endangerment Assessment showed a very low risk to public health and the environment, to the general public, as the site currently exists.

However, there were a couple of potential exceptions to that. One being that if a new water supply was inadvertently developed in the high chrome concentration area, we would certainly have a significant public health impact.

Secondly, there's the potential for impact to higher risk groups such as small children, maybe if this use of the site was changed into housing or condominiums, if tha ever happened, you could expose children and things to highe concentrations and potentially face some public health impacts.

The final alternatives that were developed basically fall into about three catagories. And I reali that if you read the report these three catagories aren't specifically called out in the report, but for simplicity ar putting together the presentation, I like to present them this way, and if you'd like to refer to the fact sheet on t back, and to Table 1 and 2 on the back, you'll see the same breakdown I'm discussing now, and will also give you a cross-reference to which specific alternatives they are addressed in the feasibility study.

The final alternatives fall into a no action alternative, as one of them. And no action means that there's no remedial cleanup or -- on the site, there's nothing done with this soils or with the ground water. However, part of that would be in monitoring program to monitor the plume, monitor the contaminants in the ground water; are they moving to the river, are they moving to the Vancouver wells, where are they going. And it would also include some institutional controls to prevent housing from being developed on the site, and that type of thing.

The second group of alternatives is what I'm referring to as source control alternatives. And these involve both surface soils, the top foot and a half, and subsurface soils, which takes us down to about 20 feet below grade.

The ground water control alternatives are grouped into a couple of alternatives, one where we would remove ground water, treat it and reinject it into the deep acquifer, the Level B acquifer, it would be treated to drinking water standards and be reinjected. And the second one, too, would be treat the ground water and discharge it tc the Columbia River.

First I'm going to discuss the source control alternatives. You might think of them as the soil control alternatives.

This exhibit represents a range of alternatives, from no action, and you'll notice there's some dollars related to no action, this is the monitoring program. And these costs represent the present worth costs of a 15 year program. And they range through doing things with surface soil to handling surface and subsurface soils, whether they are be removed and disposed of off site or treated in some manner.

The alternative of removing surface soil only would look something like this, on a site plan. And if you'll notice, this little area here represents the area of soil that approximately exceeds the 550 parts per million of tota chrome, there's a little area over here in the depression area, that also exceeds it, and under this alternative those soils would be excavated and removed and disposed of off sit and clean fill would replace them.

Also part of the alternative would be a cleanin washing of the Frontier Hard Chrome structures, itself.

A little further up the line as far as soil contr alternatives is the alternative I'm calling stabilize all soils. And this alternative we would remove surface soils and subsurface soils that have total chromium greater than 550 parts per million. These soils would be mixed with a cement type of material, a lime, fly ash, and the idea here is that we keep the contaminants in the soil column or in t soil matrix, itself, and we replace it back into the excavation, so we leave the contaminants on site but basically tie them up so they don't leach and percolate an migrate down into our ground water.

This alternative looks something like this on the site plan. You'll notice it's a much larger area, because we're talking about that clay zone that Kevin referred to earlier that's about 20 feet below surface. That's where the high concentration of chromium is in the subsurface soils. We're talking about a much larger area, this would be a pit about 20 feet deep. The soils table would be taken over to the area, mix them and blend them with the additives and cement or whatever alternative we choose, if this is the chosen alternative. And they would be replaced and impacted back in the fill area. And also the area in the depression that would be addressed.

A more expensive alternative is what I call here the leach/treat all soil alternative. It's about three times more expensive. It's a similar alternative to the stabilizing alternative, except we'd excavate the surface and subsurface soils, and basically wash them. We rinse it with an acid rinse, and that takes the chromium out of the soil, puts it in the liquid phase, and we have to treat the liquid to remove the chromium, and the "cleaner soils" are replaced back in the excavation.

That alternative looks very similar to the stabilization alternative. Again, we're talking about the same area for excavation, the same amount of material. And we'd have to have a little soil treatment area to handle the materials and grade the materials and wash the soil.

Another alternative that has been investigated the report is the remove and dispose all soils alternative. And this alternative would excavate the soils greater than 550 parts per million, and the soils would be disposed of on or off site in an appropriate land fill type situation. And then clean fill would replace the excavation.

One item that you need to note here in regards to all the alternatives that remove all soils is that we encroach significantly into the Frontier Hard Chrome building, and if that is a chosen alternative, we would have to remove and dispose of the building, as well.

Moving on to the ground water cleanup alternatives

Again, in reference to ground water, there is a alternative of no action. doing nothing with the ground water, other than natural dilution. This alternative would -- may be done in conjunction with a soil cleanup alternative. In other words you may have a soil cleanup alternative and do nothing with the ground water, that's wha this refers to.

Two alternatives for removing and treating ground water are to remove the ground water, pump it out to the ground, treat it to essentially drinking water standards, ar then reinject it into the Level B acquifer.

When we remove the ground water we're talking only about cleaning up the Level A acquifer, the shallow acquifer. It is very, very expensive to even think about cleaning up or pumping out and treating the Level B acquifer, and for cost purposes relative to the incremental increase in benefit, it has not been considered as a final alternative at this time.

The second alternative for handling the Level A acquifer zone is to remove the water, pump it out, treat it to better than drinking water standards and discharge it into the Columbia River, into a surface discharge. The approximate costs for these alternatives are very similar.

The treat and reinject is about 12 million 9 hundred and some thousand dollars, again, over a 15-year period.

The treat and discharge is about 12 million 866 thousand dollars, again, present worth over a 15-year period.

Any of the pump and treat alternatives of Level A would be done in two phases. The first phase would install a series of withdrawal wells in the very highly concentrated area inside the ten part per million contour zone. And the highly contaminated ground water would be pumped out, treated and then either discharged to the Columbia or reinject into the Level B zone.

A second phase would follow that, and you need to adjust your reference here, as far as scale. This is a much larger scale map. We would expand the withdrawal well field significantly, adding some additional wells and a much larger area. This contour line here represents drinking water standards, in other words inside the area we exceed drinking water standards, outside the area we currently meet drinking water standards. So, we would pump and treat this water in the Level A zone, and again treat it to drinking water standards or slightly better for discharge to the Columbia River.

The treatment technology exists for ground water treatment. We're probably looking at an ion exchange proces to remove the chromium. This is a standard water treatment process, a proven process, it's been around for years an years, and basically it's like a water softener in your home. It can handle the volumes of water we're talking about, it can also meet the discharge requirements that we' talking about, the drinking water quality standards.

If we went to a surface water discharge, we've explored some preliminary routes to get from Frontier Hard Chrome down to the river for an outfall. There's a couple different ways to go, either a pressure line or a gravity line. These are alternatives that are being reviewed at th time.

And what I'd like to do is turn the meeting over

Dave Rountry, who will discuss their thoughts on some of these final alternatives.

Dave?

MR. ROUNTRY: Thank you, Bob. Ecology and EPA have chosen to divide the decision making process for the cleanup approaches into two directions. And as Bob indicated the logical way to split this has been to look at source control, soils removal and to look at ground water cleanup.

This was done because Ecology is prepared to make a recommendation to EPA after we've evaluated public comment with respect to the source control cleanup. And very importantly we need to continue to make progress at this site.

By handling a source control alternative decision at this time it will allow some remedial action to move forward. A decision regarding a cleanup approach, if that's necessary for the ground water would be addressed at a later time: in fact, this coming spring.

We're not prepared, Ecology is not prepared to make a final recommendation to EPA at this time with respect to any of the ground water cleanup alternatives. We need to evaluate the impact of our new, the state toxics law, and how we satisfy the intent also of the federal law. EPA and Ecology do need to be in agreement, in order that we can be able to implement this in a cost effective manner. A concerr is chat the Superfund requirements apply a ten percent cost share measure to any remedial action that the state would -- -- state's participation in costs of cleanup or remedial actio would be ten percent of the total cost, then EPA's cost would be 90 percent. Of course this presumes that there would be no funding of the remedial action by the responsible parties.

This split decision process would provide for a decision or a Record of Decision on EPA's part by December 31st of this year. And again, a decision would be handed down by EPA with respect to an appropriate ground water cleanup approach sometime in spring of 1988.

I'd like to talk a little bit about the source control portion of the cleanup. You'll recall from Bob Smith's talk the alternatives for source control range fr surface soil cleanup option, clear to an option that would involve surface and subsurface soil removal. Just to refres your memory, these were the costs of the various source control options, as presented by Bob.

This source control approach would be to meet an objective to primarily reduce or stop further contamination of soil contaminants to the ground water and secondly to reduce a potential for health risks due to contact with surface soils.

Ecology's preferred alternative at this point, an what we are recommending for your consideration primarily i to stabilize, to remove and stabilize surface and subsurface soil. This would effectively stabilize the contaminants within the soil, it would effectively bind the chrome, so it would not be available to the environment, it would reduce further migration of chrome to the ground water.

It appears to be a cost effective approach, and most importantly this approach is protective of public health.

I'd like to review the alternatives for ground water cleanup. The primary objective for ground water cleanup is to reduce the risk to the public through the use of any contaminated drinking water. But I'd like to back up for just a second and remind you that the existing plume of contaminated ground water does not currently and is not anticipated in the future to impact current or existing drinking water supplies. Nonetheless, both the federal and the state ground water protection requirements identify drinking water standards as an applicable cleanup standard where there is potential for use of water for drinking water source.

We're also committed through the Superfund laws to implement a cleanup of the acquifer and a cleanup of the site in general to the "maximum extent practicable".

The range of ground water alternatives that I'd like to address briefly, and they're identified on this chart, cover, again a range of alternatives that are practicable and they would meet drinking water standards.

You can see from this graphic that the differen is, difference in these cleanup alternatives is in the cost and in the time to achieve drinking water standards. In the far left column is a description of the alternative, the total cost, then, and then the time to clean up the Level A and the Level B portion of the acquifer.

I should point out, too, that each of these alternatives or reflect again the point made in earlier presentations, that all of these alternatives would be preceded by a source control cleanup alternative. There hasn't been much logic that would lead us to a decision to pump and treat ground water or to pursue a ground water cleanup without removal of the source of contamination of chrome in the soils. It's very likely to and we'd anticipa that because of the time period at a minimum to achieve drinking water standards of 15 years that during this time period there would be a need for some zoning requirements o some land use restrictions in the area of the contaminated drinking water plume. The purpose being to restrict ground water access or restrict construction of wells from access that ground water for drinking water purposes.

And secondly, there's potential that there would need to be some restriction of any construction activities that might disturb or interfere with soil stabilization that would have occurred previously.

So, we call these land use restrictions and zoning ordinances institutional controls, and it's very likely that institutional controls would be necessary as part of these ground water alternatives and, in fact, including source control.

EPA's preference, as far as a choice of a ground water cleanup alternative, is to expedite this process, and to implement a ground water extraction and treatment scheme, one of these alternatives.

Ecology's preference at this point is to rely on a source control measure, the benefits of that have already been described. Again, both agencies are planning to evaluate further the need for ground water cleanup to define appropriate levels and a time frame for cleanup.

We will very much appreciate your comments regarding these alternatives, plan to include them in consideration, in Ecology's consideration, so that we can prepare a recommendation to the Environmental Protection Agency, with a recommendation for final cleanup alternatives at the site.

So, we would appreciate your help in moving us towards that decision. I sincerely request your comments.

That's all I've got and I'd turn the floor over to our moderator again, Lynn Bernstein.

MS. BERNSTEIN: At this point, we encourage peo to ask questions. We know that the site has got a lot of media attention lately, and we want you to ask questions and clarify any concerns you have now, and please hold your comments until we've finished responding to the questions, and then we'll have more formal time when you can come up to the front and give your comments.

Once you ask a question, I'll repeat it to make sure that I've got it straight and then I'll refer it to one of our technical staff. If anybody wants to raise their questions.

MR. JONES: Yes, I have a whole bunch of questions I'd ask Mr. Rountry. Mr. Rountry, I have in hand the document, a part of a document that is dated October of 1984. And this document says in part relating to the Frontier Hard Chrome site, that chromium, including the mor toxic hexavalent form has been detected in industrial and drinking water well three-tenths of a mile from the site. Now, I want you to tell me here tonight, so it's on record, and we can take it to Washington, D.C., where there was a drinking water well that was contaminated to any extent by chromium.

MR. ROUNTRY: Mr. Jones, I'm not able to answer that question. I have been involved on the site for

MR. FREEMAN: My name is Kevin, Kevin Freeman.

MR. JONES: All right, Kevin. I want to know who it was that released this information to the National Priorities to get it to the priorities list that there was any well in the area that showed chromium content, drinking water well. Because that's what we're talking about, is drinking water, isn't it?

MR. FREEMAN: I think that it may be -- I don't have the document in front of me, but there may be a problem in terms of the way it was stated. The fact is that a drinking water acquifer has been contaminated with chromium. And the purpose of this investigation was to determine whether there was threat to existing ground water supplies based on that contamination. What the investigation has shown, and what was not known then is that those wells are upgradient from this source, but it was clearly a problem, a potential problem, and it needed to be addressed, and was appropriately addressed.

MR. JONES: You mentioned the word potential --

MS. BERNSTEIN: Excuse me, sir.

MR. JONES: Have you checked with the city water department to determine whether or not they have ever detected any chrome, traces of chrome in their water supply?

MR. FREEMAN: Yes.

MR. JONES: And have they?

MR. FREEMAN: No.

MR. JONES: So that we have a situation here, if I can put it in proper perspective, so that they close down this operation over three years ago, and here we are in 1987 and you're coming forward and proposing that millions of dollars of public funds be spent when there isn't a single incident of anyone who's health has been impaired or where the environment has been impaired.

MS. BERNSTEIN: Excuse me, sir.

MR. GALLAGHER: I would object as to whether the environment's been impaired. For instance, the acquifer tha is directly underneath Frontier Hard Chrome is a drinking water acquifer, it is the same general acquifer that is par of what the City of Vancouver taps out of Well Field No. . It's the same acquifer. That's the environment.

MR. JONES: Nobody is drawing any drinking water from that acquifer.

MS. BERNSTEIN: Excuse me, sir.

MR. FREEMAN: The plain and simple fact is people are drawing drinking water from that acquifer. And one of the things that has to be addressed here, it may be a misunderstanding on your part, but when water wells are pumped and produced, they have an effect on the gradients, the way the water flows in the site area. One of the purposes of this investigation was to see whether the pump had a sufficient effect -- a high enough effect on the gradients or the way water flows in the area to put those drinking water supplies at risk. And there was no way to know that a priori, information had to be gathered to determine that. Information has been gathered, the facts have been reported to you, and you will not see anywhere in that RI where it says that well field No. 1 or well field No. 4 are at risk.

MR. JONES: What you're saying, then, is that by virtue of your testing, and the knowledge that you now have, that there is no potential hazard to the city water supply pumped from that area?

MR. FREEMAN: That's correct.

MS. BERNSTEIN: Excuse me, sir.

MR. JONES: Yes, dear.

MS. BERNSTEIN: This is for quick clarifying questions, and I'd like other people to have the opportunity to speak.

MR. JONES: I have a lot of more questions, and I'm a citizen and a taxpayer. I thought this was a public meeting where we could --

MS. BERNSTEIN: Could I finish, please?

MR. JONES: You know, the only way that you can get evidence -- I'm an attorney of 53 years practice in this state, 36 of which was in the prosecutor's office. I know that -- what you have to do in the first instance is get facts. And not speculation about oh, if something happens somebody might be affected. I want to know from these pe what testing they have done, and what they have actually developed that is a hazard, existing hazard realistically. Now, I want to develop that.

MS. BERNSTEIN: I would like to just explain our process to you, how we're conducting this meeting. That -- it's fine for you to ask questions, I'd like other people to have the opportunity to speak. We have to be out of this room at a certain time, so if you want to ask a few clarifying questions, now. Could I please finish?

MR. WALTER NETH: I yield my time to him.

MS. BERNSTEIN: I would like to finish my statement. First we'd like to ask questions, and then there will be an opportunity to give comments and during the comment time, we'd like you to summarize your comments and all the long written text, if you have a lot of comments wi be included in the text, will be included in the transcript of the meeting, and what we would like now is quick clarifying questions, and then summarized comments, what yc feelings are in summary, and then the complete text that yc have will be included in the transcript.

MR. JONES: Well, I'm not entirely without some knowledge about these things, because I've given a good de of time to making a study of the situation.

MS. BERNSTEIN: Could I --

MR. JONES: And I've also given a good deal of time to making a study of whether or not there is a hazard existing which requires any remedial action in the expenditure of the amount of money that you've been talking about here tonight. And I think as a citizen I'm entitled to that.

MS. BERNSTEIN: Could I just ask that if anybody has questions --

MR. JONES: I'll defer, I'll shut up for a minute.

MS. BERNSTEIN: We can come back to you, but I want to give everybody the opportunity to speak. And then we have until 8:40 before we take comments.

MR. NISSEN: I'd like to ask a question, I guess, of the group at large. Is there anyone in attendance here tonight who does not have either a business or a vested interest in this, in other words is there anybody that would qualify as a disinterested citizen that came by to see what was going on?

MR. ROUNTRY: I believe we're all interested in the site.

MR. NISSEN: So there is, in essence, no public attendance at this meeting, is that correct?

MR. GALLAGHER: We're all public.

MR. NISSEN: We are all salaried people on this thing.

MS. FLESKES: We are, but what about the rest of you?

MR. NISSEN: We're not.

MR. GALLAGHER: But you're public.

MR. NISSEN: We are the public.

MS. LAWSON I think what he's asking of anyone sitting out here, is there anyone that's not an interested party, either through business or -- I don't want to steal your question from you, but it was an interesting question.

MR. NISSEN: Basically is there an interested public citizen here who is concerned about his water supply? I'm open. Does anybody care is what I'm asking, in Vancouver.

MS. BERNSTEIN: Anybody want to raise their hand?

Are there any other questions? Could you please come up here by the microphone and give your name, please, and ask your questions from here, by the microphone.

MR. GILMORE: I'm Mike Gilmore, I'm the manager c Angeles Metal Systems, who is the tenant of the facility at this time. I'd really like to know who wrote this article which department.

MR. ROUNTRY: Are you referring to a fact sheet presented recently to the public?

MR. GILMORE: That's correct.

MR. ROUNTRY: That was a joint agency publication. It carries the letterhead of the Department of Ecology.

MS. BERNSTEIN: There has been a revised edition.

MR. GILMORE: Very similar. It says here the only potentials to the workers who are occupying the building, to those working on the facility. Directly below that is a controversy to that statement, saying it's below industrial standards. I'd like to know tonight, is there any risk of our employees at this facility or not? And if so, what are those risks?

MR. ROUNTRY: Mike, I know as foreman of Angeles Metals, you're familiar with the occupational standards. Our Endangerment Assessment conducted regarding the contaminants at the site show that the contaminants do not exceed occupational standards for risk to your people.

MR. GILMORE: But you said here in your statement there's a potential risk, what is that potential?

MR. ROUNTRY: I'd like to refer your question to Megan White, an engineer on our project team.

MS. WHITE: I think when we're talking about potential there is -- when we were doing the Endangerment Assessment to try to evaluate health risks on the site, air samples were taken from inside the building and were determined to be below occupational standards. And there was sampling conducted outside, and modeling of the soil concentration in the surface to try and assess any potential air exposure hazard outside of the building. And the Endangerment Assessment showed that there was essentially -- there was very little risk associated with either inside or outside the building. However, there was -- the model was not able to address a potential for short-term exposure, and that's really why our source control alternative includes removal of the surface soil to fix any potential that may exist for short-term exposures.

MR. GILMORE: What are those short-term exposures you're talking about, somebody eating the soil or eating the bricks?

MS. WHITE: No, we did not -- the health assessmen conducted did not show a potential problem due to soil ingestion on the site. The potential for short-term exposures would be, for instance, exposures due to trucks moving on the site in excess.

MR. FREEMAN: In other words breathing.

MR. GILMORE: There's probably a hundred trucks a day going by the site, as you know, as you're working there there is continuous workers on the site. And also you wer there, there is monitoring machines on some of our employe and they were on the buildings in the dusty areas and outside. Now, if these all showed below, where's the potential?

MS. WHITE: Like I said, that's a very, very conservative assumption, so it would be a conservative approach to take in removing the contaminated surface soils. And also those surface soils act as potential contaminants to ground water, which is where our real concern is focused.

MR. GILMORE: Your recommendations at this time are for us to evacuate the building, is that correct?

MS. WHITE: That's not my recommendation.

MR. GILMORE: The statement you've made here in this paper, the liability leaves us in an awful bad spot with our employees. Now, either somebody's got to correct the statement saying the facility is safe for workers to be in or it's not safe. It cannot be a possible.

MS. WHITE: I think at this point I'd like to hand it back to you, Dave, because you have talked to --

MR. GILMORE: Somebody's got to determine is this place safe for employees or not? Now, here you've got a contradiction in your paper, one line right below the other.

MS. KAPLAN: Read what you're concerned about.

MR. GILMORE: The only potential health risk at this time may be to workers using the building. I'll jump down a little bit. It says also there may be a health threa to the workers on the site, because of potential for raising chromium dust. However, the estimates show that the level o hexavalent chromiums in the dust are below the current occupational health standards.

MR. ROUNTRY: Mike, I believe the last question I asked was is this facility safe for employees to work in, the answer again to that question is yes.

MR. GILMORE: That's all I have. You wouldn't mind writing me a letter to that, please?

MR. ROUNTRY: I'd be glad to follow-up on that.

MR. NISSEN: I'm just curious, there's been a lot of -- it's been substantially below, substantially above or whatever, and specifically on this question, what kind of levels did you find? Can you tell us how many milligrams pe cubic meter are the accepted industrial exposure, and what did you find relative to that limit. We've been throwing around much lower, substantially lower, put a few numbers out, so we can -- we need some numbers to deal with.

MS. BERNSTEIN: So, you want specific numbers with actually in the building for occupational standard, to compare to occupational standards, is that what you're asking?

MR. NISSEN: You spent a million dollars studying the problem, you should have some numbers.

MS. BERNSTEIN: You want the numbers from inside the building, the whole site or what?

MR. NISSEN: You spent a million dollars already

MR. NISSEN: The standard industrial limits, I believe, are in milligrams per cubic meter, are they not?

MR. FREEMAN: That's correct.

MR. WALTER NETH: You're measuring in micrograms, and as we pointed out, you know, we have not raised this as a major health related issue at the site. Our primary concern is ground water.

MS. BERNSTEIN: Excuse me, sir, could I have your name for the record?

MR. WALTER NETH: Yeah, my name is Herb Nissen, I managed the site from 1976 to 1983 when I closed it down.

MS. BERNSTEIN: Thank you. Sir.

MR. WALTER NETH: Why do you keep referring to drinking water standards, when nobody is going to put a drinking water well there anyway, we couldn't get a permi build a well to get wash water. So, you keep talking drinking water standards, a lot of barn yards I wouldn't put a well in, too, so it looks ridiculous -- I looked through this for a week, and I'm not just out of my ballpark, but I've been looking at those books for a week down at the library, and we've got these shipped to the house just a fe days ago. But you could decipher that or you could figure this thing out you could just easy walk away from the site. There's nothing wrong with that, because it indicates there no problems anyplace. You could walk away from it if you analyzing the thing over five years. You're talking about spending at least another two million, plus God knows how much for ground water. Now, if you spent a million dollars you should have some concrete, cut and dried numbers, how bad is it?

MS. BERNSTEIN: Could you just specify, I'm going to ask Kevin --

MR. NISSEN: In reference to Mike's questions. The air.

MS. BERNSTEIN: Within the Frontier building?

MR. NISSEN: One of your primary concerns is excavating all the soils to prevent air contamination.

MR. FREEMAN: We have several copies of the remedial investigation report here tonight. There is a table in the -- and I believe it's in section 5 of the report, which has exactly what you're asking those levels --

MR. NISSEN: Those two tomes over there? I don't have time tonight to go through those. I'm just curious.

MR. FREEMAN: I don't have the numbers committed -- I myself have a lot of numbers in my head right now and they get mixed up. There is a table that gives the exact expenses that we found in micrograms per cubic meter, I believe are the units, and it's in section 5 of the report, and maybe afterwards you and I can go back there, I'll show you where it is, and we can look at it.

standards that might apply to a given site. There's a procedure that's established for that, and the law requires us to look at what are considered to be applicable, and relevant standards for a given site. There is, in fact, within that, an exemption that can be granted from drinking water standard. If you could show that upgradient of your site, and in the general site area within that acquifer the contamination was of such a character, the chromium contamination of that acquifer from other sources was such that you contributing to it had essentially done nothing in excess, you hadn't really ruined the resource, the resource was already in a poor state before it came on to the property with similar contaminants. That is the only way that we can take an exemption from drinking water standards as an applicable standard to that ground water under the SARA provisions.

MR. WALTER NETH: You found a loophole to spend money.

MR. FREEMAN: No, sir, I follow the regulations.

MR. WALTER NETH: But there is a loophole that you -- in my opinion, the only way this got into Superfund is that misquoting that there was contaminants in drinking water, well water to start with, or it never would have gotten into the Superfund, you never would have gotten in the honey pot to start with. You put it into Washington in that standards, where would you be in any violation there?

MR. FREEMAN: I don't think you'll see anywhere in the document where we have said that we believe there's a threat to the Columbia River. We have stated, and I just stated to you previously that surface water is not an area of concern, here. We're concerned about ground water supplies.

MR. JONES: If these waters that you term as ground water flow into the Columbia River, and they're diluted because of the heavy volume of water in that river, where is any hazard?

MR. FREEMAN: The hazard results from our fear that it is -- there is a potential that ground water resources could be developed in that area, and if there were, there is a risk inherent in that development.

MR. JONES: What evidence do you have that there's anyone planning to make any development down there that in any way affects the ground water that exists there today?

MR. FREEMAN: Sir, you know, I could follow that up by asking you, you're obviously a very good attorney, whether you would -- if I had a piece of property nearby and I wanted to drill a ground water well into Level A and I just went out and did it, whether you would say I had a right to do that.

MR. JONES: Well, no, because you have to get permits to drill a well. Mr. Neth addressed that subject. They wanted to drill a well just to use the water for washing manner, and misrepresent.

MS FLESKES: Just one thing. Policy as to what type of rules and regulations and how clean we have to cle up sites is set by both Congressional and the state legislature. We as a governmental agency have to follow those rules. We don't make them all. And we do need to follow those rules on this site. Once it's into the Superfund process, whether right or wrong in getting there, we have to follow the rules to get it out again, and that means going through the process.

MR. WALTER NETH: There's no way you know how to turn it off?

MS. FLESKES: Not unless we can justify there's no problem there and we can find a way to get it off the list.

MR. WALTER NETH: No money will stop it?

MS. FLESKES: It will delay it until additional money, but it doesn't cause the site to go away.

MR. GALLAGHER: In addition, if there is a potential for a drinking water resource to become contaminated, it can qualify for Superfund. It doesn't ha to actually be contaminated, but the potential exists. An at this site it's far beyond the potential, a drinking wat resource is contaminated, grossly contaminated.

MS. BERNSTEIN: Could I have your name, sir, for the record?

MR. WALTER NETH: Walter Neth.

MS. BERNSTEIN: I have your name down to make comments later on. Is there anybody else that has questions right now? I don't know your name, sir.

MR. JONES: My name?

MS. BERNSTEIN: Yes.

MR. JONES: Dewitt Jones.

MS. BERNSTEIN: Would you like to come up to the microphone and finish asking your questions?

MR. JONES: I would like to know from this group whether or not at this time on this night you have any evidence that there is any hazard to life or to vegetation, to the environment at your so-called layer A, as it exists at its location in place?

MS. BERNSTEIN: Could I clarify that? Are you asking -- Level A is the top half of the --

MR. JONES: Level A is one of the levels --

MS. BERNSTEIN: In the ground water acquifer.

MR. JONES: In the ground water acquifer, and they have said it has a concentration of chrome or hexavalent in excess of drinking water standards. What I want to know is whether or not at this time and place that's a hazard to anybody.

MS. BERNSTEIN: Okay. Bob, would you like to answer that?

MR. SMITH: I think we've said throughout the presentations here that there are no existing drinking water supplies contaminated at the current time, that the potential for someone to drill a well is the item of concern, but there are no existing drinking water supplies that are currently contaminated. We've said that several times.

MR. JONES: If I were to go down there, suppose, and got a permit and dug a well 80 feet deep, do you have any evidence that there is any contamination from your studies that would be at that level?

MR. FREEMAN: At 80 feet? I think given what we know right now, you would probably have a hard time convincing someone to allow you to drill a well at 80 feet there.

MR. JONES: I agree that people aren't going to drill wells down there for various reasons, and that is one of the problems that we are confronted with here tonight, an that is to go in and spend money in a location and an area where admittedly nobody's health is at risk. Now, I want to ask you in that connection, you have one instance, just one of anyone where a doctor has said they fell ill because of any condition that exists at the Frontier site? Just give to me.

MS. BERNSTEIN: Dave, do you want to answer that question?

MR. ROUNTRY: I don't know of any people that have fallen ill, fortunately, from drinking water from this contaminated ground water plume. Fortunately, there are no drinking water wells accessing this plume.

MR. JONES: Well, then, isn't it a true statement that you have no evidence at this time that anybody has been hazarded in connection with their health and well-being as far as that site is concerned?

MS. BERNSTEIN: Dave.

MR. FREEMAN: I think the operative question here is has anyone up to this time been hazarded by the contamination of the ground water supplies. And I would say that at the time that the FMC wells were operating there were, although those were not drinking water supply wells, there was production of contaminated ground water, in other words contaminated ground water was being produced, brought from underneath the ground up to the surface. And anytime you bring a contaminated water supply to the surface you run some risk that there could be a human exposure to it. And I would submit to you that you have no evidence that that is not the case, in other words no system, no system of ground water, of water useage from a ground water supply is so sacrosanct that it cannot develop a leak, that there cannot be some exposure to either workers or local people of this contaminated resource. And I think Dave stated it very well that we've been very fortunate that no ground water drinking water wells have been affected by this contaminant plume. I would submit to you, howeve that if anyone did drill wit that contaminant plume, that there would be a severe health risk.

MR. JONES: How would there be a severe health risk, even assuming that condition, which isn't going to happen?

MR. FREEMAN: Sir, we have, on the site, there are, I think I showed you, that within the Level A acquifer zone, there is contaminants in excess of a hundred parts per million. The drinking water standard is a .05, you're an intelligent man and can make the multiplication that can tel you how far in excess of the drinking water standard that is.

MR. JONES: It might be a thousand times greater. But my point is it does not present any hazard to the well-being or the health of anyone in this community. It hasn't and it won't. If you leave it alone, it will take care of itself. You've got a level at A and you've got a level at B, now what's your level at B?

MR. FREEMAN: The level at B is in excess of .05 ppm over a broad area.

MR. JONES: How much?

MR. FREEMAN: It goes up to .32 ppm.

MR. JONES: Have you determined where the water from that acquifer ultimately flows?

MR. FREEMAN: It's definitely going in the direction of the Columbia River.

MR. JONES: Have you, in connection with your studies, examined and tested the water in the Columbia River?

MR. FREEMAN: We are familiar with the water in the Columbia River.

MR. JONES: No, no, I asked the question, have you tested the water in the Columbia River --

MR. FREEMAN: I think the intent of your question is to ask whether we see any evidence of contamination of the Columbia River associated with this site.

MR. JONES: Yes.

MR. FREEMAN: What I would say to you, sir, since this appears that this contamination is going to, and may in fact have reached the Columbia River, that in itself is evidence that there has been contamination either presently or in the future that would affect the Columbia River. The question perhaps should be better stated do I think that particular level of contamination poses a risk to the Columbia River. It is our belief that there would be enough dilution as this stuff reaches the Columbia River that health effects would probably not result from that, which is why we have not spent any of the public's money on extensive surface water sampling.

MR. JONES: Your belief, then, is, and I hope yo state it in the record clearly, whatever you send to Washington, D.C., because I want it in the record, that this group of people have not found any condition in which any contamination has gone into the Columbia River that has saturated that water to a point where it is below any -- or above any standards that you might apply, including the drinking water standard.

MR. FREEMAN: We would be forced to apply an even more restrictive standard if we were, ourselves, discharging to the Columbia River. Which we would, in fact, have to cleanup to under the -- you saw that one of our remedial actions involved discharge to the Columbia River. We would in fact, cleanup to a much more restrictive standard if we did that.

MR. JONES: Well, is it true that what you're concerned about is the amount of chromium, hexavalent that' in a water supply, is that your concern?

MR. FREEMAN: Both with hexavalent and total chromium.

MR. JONES: Assuming you put in hexavalent into Columbia River, and because of the volume of water it was diluted, so the water was well below the drinking water purposes, and the -- and they were denied that by the state department. So --

MR. FREEMAN: I think maybe Mike could address wh the regulations are.

MR. GALLAGHER: Regulations are, you need a permit if you withdraw up to five thousand gallons a day; under that you do not need a permit. But you have to --

MR. JONES: Here you people sit proposing to spend millions of dollars of public money, and that's what you're proposing to do, when you don't have a situation existing where anybody has been harmed or hurt or you have no evidence now. You say about a potential. I could speculate about anything in the world, but I'm interested in evidence and hard facts.

MS. FLESKES: I have a question of you, do you think it is proper public policy to foreclose a use for two to three hundred years, where we at this point don't have ar idea what the future demand may be? And that's what we're talking about. That's the issue we're talking about.

MR. JONES: I know you --

MS. FLESKES: I'm asking --

MR. JONES: You can estimate 90 years, 50 years, doesn't mean a thing, because if it isn't broke don't fix it. Now, that's a pretty solid rule. And what I hope as a citizen -- I want one more question about the environment, because I'm curious about that. I've been watching that area down there for years, as a citizen in this community.

What tests have been made in connection with the blackberries, the grass, or any of the things that exist down there that are part of the environment? The rabbits that run around there, have you tested any of those to see if they show effects of chrome? There are dozens of them down there, you know. That's a part of nature. Now, have you, just answer the question, have you made any tests in connection with any of the environmental situation down there, including the plants, the growth and so forth, and if so, I want your -- I want to know what the score is on it.

MR. FREEMAN: Well, to answer it very directly, no, there have been no such tests. But if you'd read the Endangerment Assessment, we don't believe, given the vegetation on the site, that there is a pathway of significant concern in terms of, for instance, the blackberries.

We still, you know, don't recommend that people run out there and eat lots of them, but nonetheless it does not appear to be a significant concern at this point. And I think that's stated in the document.

MR. JONES: Why don't you -- why do you put it in your literature, then? Why do you put it in the background, why do you have all these phrases in there that are -- that raise peoples question about oh, my goodness, four hundred times -- it's in the ground, it isn't going any place. I could sleep down there day after day if I was younger and a tent, I'd never be bothered by it, you know that, you've got the evidence. And you don't have any medical evidence that is contradictory as far as this site is concerned, and these problems are concerned.

So, in conclusion, I want to put in the record, so it goes to Washington, D.C., that you people do not have the evidence, only the potential speculation. And that should not carry the day to spend the amount of money that you're proposing to spend. And as a citizen I object to it. Thank you.

MS. BERNSTEIN: Thank you, sir. Sir, could I have your name again, for the press?

MR. GALLAGHER: Dewitt Jones.

MS. BERNSTEIN: Mr. Dewitt Jones.

MS. PAT NETH: Getting back to the blackberries, they did say, somebody over there, two or three times about the blackberries being contaminated. Did they ever test these blackberries? They say they're contaminated, they wouldn't eat them. Why wouldn't they eat them?

MS. BERNSTEIN: Could I have your name, please?

MS. PAT NETH: Pat Neth. If you say you shouldn' eat them, you must have tested them, or else why would you

Ecology. And you'll find the address in the fact sheet.

So, Walter, if you want to come up and speak first?

MR. WALTER NETH: I would like to know who, where, when makes any kind of decision on what happens of after you hear the comments, here, where is it going to be, who is going to make the decision and is that open to anybody on the outside or is that a closed meeting?

MS. BERNSTEIN: Could I refer that to Phil Wong of the EPA?

MR. WONG: The process from here on out is that once all the public comment is brought in, responses would be put together, which essentially is the agency for or EPA responses to all the various comments, Ecology and EPA together will write what is called a Record of Decision, which will be the formal decision on how to proceed on this site. EPA actually signs this Record of Decision, at this point -- at that time the Record of Decision goes out for comment, pretty much it's final at that point, whatever decision has been made. So, in other words your comments should be -- in order for your comments to best be accomodated, they should be sent in during this comment period.

MR. WALTER NETH: Who makes the decision, that's a point I asked you.

we're proposing at this time for source control is identified in the literature as the SS alternative.

MR. NISSEN: SS.

MR. ROUNTRY: SS.

MR. NISSEN: I guess I have a question about -- and as I understand the ground water situation is still up in the air, is that correct, you have not made a recommendation, you have not arrived at any conclusion at this point as to what to do about the ground water?

MS. BERNSTEIN: That decision will be made this coming spring.

MR. NISSEN: We're six months out on that decision?

MS. BERNSTEIN: Right. But you can make your comments on that tonight, this is the time to do that.

MR. NISSEN: One of the things I've noticed in here, is that you've uncovered a nice little mixture of chlorinated solvents in ground water today. I guess if I had a choice as to whether I had a tenth of a part per million of chrome in my drinking water or a tenth of a part per million of solvents, I wouldn't have a real hard time making a decision about which one I'd take. There isn't anything in here about the levels you found or anything. How are you going to address this question along with the chrome? If we're talking about drinking water standards, I don't know what the drinking water standards are for chlorinated solvents, but I know the EPA and OSHA and everybody else has been death on chlorinated solvents for several years, they one of the nastiest things you can mix with your water. If you intend to pursue cleanup of ground water, are we going to pump this stuff out or do whatever, I'm just in supposition, take the chrome out of it and then pump it back in the ground with the chlorinated solvents in it or take that out, too, or I would say possibly the most logical conclusion is say this stuff is not safe to drink. And I for one would find it very ill-advised to go in around any industrial area that's been in place for any length of time and drill a well and drink the water. I think you know that as well as I do.

MS. BERNSTEIN: Can I clarify, are you asking what is going to be done about that, are you wanting to know what the levels are?

MR. NISSEN: I'm not asking a specific question, don't care how many parts per million of chlorinated solven are there. We've talked about chrome tonight, and the grou water issue is still up in the air. I think obviously you know it's there, it hasn't been mentioned, it hasn't really been addressed. I assume it's an area of concern that it's there. And I assume that it's going to be taken into consideration when some kind of a -- I hate to say return investment -- but that's something we use in the private

MR. WONG: EPA.

MR. WALTER NETH: Who's EPA?

MR. WONG: At this point, it will probably be Ro Russel, the regional administrator.

MS. BERNSTEIN: EPA is the Environmental Protection Agency.

MR. WALTER NETH: He's going to listen to public comments or only listen to what you guys are going to tell him?

MR. WONG: The comments you submit during this meeting and during the rest of the public comment period, these will all be part of the Record of Decision.

MS. BERNSTEIN: I would like to, as community relations person, explain a little bit about that process. We take everything from this meeting that will be in written form, up until the 19th of this month. And it's written up and summarized into what's called a responsiveness summary, and then EPA uses that along with recommendations from Department of Ecology to make their decision, and in their Record of Decision they need to respond and show how they have responded to the citizen's concerns. So, there's a ve specific document in how the agencies, both federal and state, have responded to the citizen's concern, and that is the purpose. This meeting is a federal requirement, the responsiveness summary is a federal requirement.

MR. WALTER NETH: I know this is a federal requirement. But I wondered if it had any effect. I think sometimes these go just because they're a requirement, well, we got that out of our hair, and now we go back and make the decision, that we've got planned already.

MS. BERNSTEIN: I'm pretty sure the Record of Decision and the responsiveness summary is available to the public, once a decision has been made. And once again to reiterate, a decision on the soil alternative will be made by December 31st, and then they'll be one made on the water from Spring of '88.

MR. WALTER NETH: Can anybody else sit in on those meetings or is that a closed meeting?

MS. FLESKES: It basically becomes a government decision once the comment period is closed.

MR. JONES: I have one more comment and that is to direct attention to the people who are working with the DOE that there is pending in Clark County, Washington, a lawsuit and that that lawsuit would permit us to come into court and to have a hearing in a court of law, so that the decision could be made because peoples property and their right to use property cannot be taken away now, thank God, by a group of people in a particular agency. So, I call that to their attention, before they go forward with making any plans, they're going to have to come into courts and face the judge and a jury, perhaps, and have this matter decided by someone locally who can evaluate what we've been talking about here tonight.

MS. BERNSTEIN: Okay. Would you like to give your four minute comments now?

MR. JONES: Pardon? No, I've already given my comments. I think my position is fairly well stated, I hope.

MS. BERNSTEIN: Would John Riser like to come speak?

MR. RISER: Yeah, you bet. I'm half owner of Richardson Metal Works, I'm right next door to the so-called site. My main question is just whether or not in the budget numbers of your different cleanup processes, whether or not there's anything cut for reimbursement to the surroundin businesses for disturbance to their normal business? I mean obviously a lot of them entailed digging a big hole right behind my shop which is my major staging area, let's put so wells back there and mess things up good. I'm just wonderi where do I go for getting reimbursed? I'm an innocent part and all of a sudden somebody is coming over my fence and drilling a well.

MR. ROUNTRY: No, I'm afraid it's not so simple. To answer your question, those potential costs in litigati was not considered in the costs of these alternatives as you've seen them presented in our reports or in our presentations tonight.

MR. RISER: What resource do I have, then?

MR. ROUNTRY: Recognized that the potential is there for litigation, frankly it's the resolution of that, I can't respond to at this time, I'm not in a position to -- I'm not a legal person. If it's an issue that remains, it will be addressed by our legal staff.

MS. BERNSTEIN: Is that a question we could get back to by consulting our attorneys?

MR. RISER: I'd love to have somebody call me and let me know what I can do about this. If you dig a hole behind my shop, you're going to cut off my major staging area, my shipping and receiving and everything. It's going to make things very difficult for me.

MR. ROUNTRY: I understand your concern.

MS. BERNSTEIN: So, we can consult our attorneys and --

MR. RISER: A letter?

MS. BERNSTEIN: And get back to you.

MR. RISER: Is there any time frame you're used to getting back to somebody in this case, because I'm not going to go too long.

MS. PAT NETH: Drag it out as long as they can.

MR. RISER: Oh, really. You're telling me not to hold my breath, then?

MS. PAT NETH: Yes, don't hold your breath.

MS. BERNSTEIN: I'll let Carol --

MR. WALTER NETH: I want to make a statement, you guys put 15 guys out of work, and you've got about 15 right here replacing the jobs, but I don't think those steady jobs, I don't think those people appreciated it very much, the people that you put out of work. And the business that you broke.

MS. BERNSTEIN: Would Herb Nissen like to give comments, now?

MR. NISSEN: I just had a brief comment in going through your brief history, essentially, if I understand yo correctly, you have identified the alternative that you wan to pursue, which is solidification of the surface material down to a depth of approximately 20 feet, is that correct, the removal and -- essentially you're going to fix the chrc so it can't leach out of that area of soil; is that correc

MR. ROUNTRY: That's correct.

MR. FREEMAN: One thing we're not looking into i vitrification, that's a separate.

MR. SMITH: Use the term stabilization.

MR. NISSEN: Lock the chrome up so it can't leac out into the ground water.

MR. ROUNTRY: Specifically the alternative that sector a lot --

MR. FREEMAN: I think the question is well stated. And it was an inadvertent omission on my part not to mention that we had found some chlorinated solvents in the ground water. We -- the information we have now, which is not extensive, in terms of the chlorinated solvents in ground water tend to indicate that they seem to be coming from some source to the north, and not directly associated with the dry well discharge, okay?

MR. NISSEN: I think there's a paint shop to the north of Hard Chrome at one time.

MR. FREEMAN: The other sources could be a potential explanation, but in answer to the question are we going to address them in terms of the ground water cleanup, the answer is yes. We are not cleaning up the ground water to clean up the solvents, though, but any solvents that are brought into the water stream during the cleanup for chromium will be treated and we will not redischarge chlorinated solvents to either the ground water or discharged line. And costs have been included in the document for air stripping and carbon absorption cleanups.

MR. NISSEN: Water solvents, also. I guess just in summary, I think my earlier question or my first question this evening, I think this story has been on and off the front page of the Columbian for five years, roughly, since late or very early 1983, I think. I don't know how often it's appeared. I've got -- received copies of the articles, and it's always front page news. Frontier Hard Chrome was big issue around here. And I assume this meeting was well publicized, as well. I would say the overwhelming evidence at hand, is this is not an issue of public concern. Nobody cares. Nobody cares enough to come here tonight to listen to what you have to say, other than the people that work next door to it, work in the building or had something to do with Frontier Hard Chrome, or possibly the news media, and yourselves. We keep talking about the public concern, the public isn't concerned. In an abstract way they are, yes, but I don't think any of them plan to go down there and dril a well and drink the water. And I think that should be take into consideration when you take a look at the ground water study.

MS. BERNSTEIN: Thank you for your comments. Doe anybody else have -- would like to submit any comments?

MS. PAT NETH: Is there -- there is the maps that have to do with -- it's a known fact where the acquifers go and where the ground water flows? There is a known fact, a where the strata is and where the wells come from, and the well they're drilling here might come from 20 miles away, down under there, and there's a known fact where they go. And this water that you're seeing here, it is not -- it is not in the acquifer that goes to any one of these wells, it's a known fact that it isn't going to -- those acquifers -- they're underground rivers, and they know where these underground rivers are, and this isn't part of one of those rivers that supply any of the wells.

MS. BERNSTEIN: Is this a question or a statement?

MS. PAT NETH: That's a statement.

MR. ROUNTRY: I'd like to respond to that statement by saying that these acquifers or underground water water channels are interconnected, and in that respect it is the same water that would service the Vancouver well fields.

MS. PAT NETH: You mean you think there's -- this ground water will get -- you say right now that it goes to the river, it doesn't go back north?

MR. FREEMAN: I think the clarification that's necessary is it is the same acquifer system, but the Vancouver well fields are what we call upgradient, in other words that the water is flowing from those well fields towards the Columbia River, which means that what we've determined, and what we've reported is that we don't feel that there's a risk to well fields 1 and 4, based on the chromium contamination at Frontier Hard Chrome, because the water underground water is flowing in another direction, away from those two well fields. But the point of clarification is that we are dealing with the same acquifer system, it's just that Frontier Hard Chrome is down gradient, down water flow direction from -- down river, in your analogy.

MS. PAT NETH: What you're saying is eventually might just wash itself, if it's down river.

MR. FREEMAN: That's correct --

MS. PAT NETH: Is that what you're saying?

MR. FREEMAN: Yes, and I believe Dave had a table that he showed, which showed how long it would take for these acquifers to clean themselves for we did nothing. It was the chart --

MS. PAT NETH: Yeah, I seen that. 90 years.

MR. ROUNTRY: Would you like to look at it again?

MS. PAT NETH: I remember.

MR. FREEMAN: So, yes, in other words you've got the right picture, here.

MS. PAT NETH: But there will never be condominiu down there, there will never be houses down there. Someone says they should never put housing down there or never put condominiums. I don't know which one of you all said that.

MR. FREEMAN: Apparently, you know, there are so possibilities for development down towards the Columbia Ri in the down gradient direction.

MS. PAT NETH: Around FMC.

MR. FREEMAN: Around FMC, correct. Remember the plume extends to FMC. On the diagrams we showed Highway

MS. BERNSTEIN: We have some clarification.

MR. SMITH: There was two suggestions, one if we dealt with the surface soil one and a half feet deep, we're talking about a very small amount of material, that would be hauled off site to an appropriately regulated land fill, because it's too small of a volume to treat it or mix it.

MR. WALTER NETH: That's already a land fill, I put it in there.

MR. SMITH: It's a fill zone. The other where we excavated the surface is subsurface soils, where we stablized the soil by mixing it with a cement type material and put it back into its existing place, so we don't remove it from the site.

MS. PAT NETH: How many years is that cement stuff going to be stablized?

MR. SMITH: An additional amount of testing -- I can't say how long.

MS. PAT NETH: I've seen sidewalks disappear and crack up.

MR. SMITH: That's true, and they're exposed to the elements. There's sewers that have been in place a hundred, two hundred years, it depends on the environment. We'd have a large patch, and around the edges it might deteriorate a little bit, but it's becoming a fairly proven technology.

MS. PAT NETH: If you mix cement with dirt, it doesn't stay very good.

MR. FREEMAN: This is not Portland Cement we're talking about here, this is a soil additive that -- the purpose of this particular material is to bind up the chromium. And as long as it keeps that chromium bound up, w don't really care --

MS. PAT NETH: How fluid is it, this stuff? If yo mixed it with water?

MR. SMITH: It dries into a fairly firm material.

MR. FREEMAN: Let me say, there are a number of proprietary types of technologies that have been developed, various people have their own particular mixtures that they're marketing to do this particular treatment. And really it's a good question, but it's very specific to th type that would be selected at this site. In other words, there's not just one type, there's maybe four or five different vendors that right now are offering an additive that would be appropriate for this type of application. It would very much depend on which one you picked, how fluid it would be when you reintroduced it into the ground. Ultimately it hardens. So, much like -- and I think that's the analogy with a cement, you mix it in a -- with water an whatnot, and the additives, and then reintroduce it into th soil, and then it solidifies and at that point you've got kind of a -- what we call a stablized soil mass.

MS. PAT NETH: Let me ask you this, you said it's not exactly like a cement, it's a little different you said. Is it a liquid to begin with or a powder?

MR. FREEMAN: A little bit of both. You've got liquids -- you put it through what's called a pug mill and you're mixing water and powder and soil, additive. And then -- so, you get this mix and then much like you do on a cement mixer you put that mix back into the excavation. And then it solidifies.

MS. PAT NETH: Why couldn't a person make a mass of that and would it sink down in the dirt --

MR. FREEMAN: Like inject it into the dirt? Actually some of these are, one way people have tried to do this is to inject it into the dirt. Historically, injection programs for soil stabilization, not this particular type of soil stabilization, but any kind of soil stabilization, is very difficult to drill a lot of wells, you know, well points and inject this stuff and get a real continuous application and feel that you've really got the problem totally resolved. It's one of those things that over the years people have tried it, it hasn't been a very effective way to do a soil stabilization.

MR. WALTER NETH: Wouldn't just blacktopping the area solve your whole problem?

MR. FREEMAN: As I pointed out before, the SO alternative is very similar to that. You could, you know, put some impermeable layer on the top or you can attempt to make the contaminated soil impermeable by mixing it or you can take the contaminated soil some place else. But essentially that's the whole point. You're either removing that surface layer, or trying to make that an impermeable layer, so you don't get water going down through it. So, yes, asphalt has certain problems, but the concept you're presenting is a valid concept.

MR. OTTO NETH: What happens if you don't do anything at all? It will get better as years go on, I imagine. Right now it's been there for 35 years. And I kee reading in the book, documents back there, which are too muc for me to handle about the blackberries, and it keeps saying there's no harm if you eat the blackberries, but if young children had a playground down there, which is an industria area, I don't think you'd get one, they can ingest the soil and it would be harmful. I don't know of any kids which would turn around and eat that darn stuff, anyway. But we' using that as an example to do millions of dollars worth o project, which I don't see any problem, like I say, if you cap it, and you can't get a well in, if there's somebody f the city, you'll probably find out, if you can't put a wel down, why are we going through all this expense?

MR. FREEMAN: I think what you're suggesting, i sense what you're saying is you favor the SO alternative. I mean there's a sense in which what you're saying -- it's not exactly the same as what our SO alternative says, but it's very similar. And so in essence, you know, that's one of the things that's important about this meeting, you're giving us some feedback that you think that's an appropriate way to treat the site. I think -- I mean I think that's what I'm hearing from you.

MR. OTTO NETH: I get upset a little bit. When this started out it was going to be a couple hundred thousand dollars, just only an investigation. Now I guess it's way over a million. And there's no telling where it's going to go before the project even starts. And why should the project even start to start with? I haven't seen any sound reason that I've heard tonight that makes it legitimate to put the dollars in that you people are suggesting.

MS. BERNSTEIN: Excuse me, sir.

MR. OTTO NETH: That's all.

MS. BERNSTEIN: That's why you're here giving us comments, that's why we have an array of alternatives, and I just wanted to state that we've heard a lot of skepticism tonight about what our decisions as an agency will be, and whether or not we're taking the public into consideration, and I would like to reiterate, this will all be written up in a responsiveness summary, and it's the exact things that you're saying and everybody else is saying, that we need to hear. Is the site going to be used, who's going to be using it, what kind of public interest do we have, and I think it been really clearly stated here tonight. So, I would like -- excuse me, we need to finish up really soon. Ill take a few more questions, I just want --

MR. RISER: I have two minutes left on my four minutes.

MR. OTTO NETH: We asked for a little extension to see if we couldn't do something to keep this business going, and the chairman of the board says no, that's it, you're cut off as of right now. 35 years it's running. And we got cut off immediately. And loss our shirt. I mean the whole business closed up. That's the power of what was against us. We never had no alternative, we just had to close it up.

MR. WALTER NETH: Needless to say you know we resent it.

MR. OTTO NETH: For what reason, you people didn' do anything for a couple of years there. It was just dormant. As critical as you're making it now, and you've g to move on it. You were idle for so many years in there.

MS. BERNSTEIN: I would like Carol Fleskes to respond to that as your section head.

MS. FLESKES: Thank you a lot for that, Lynn.

MS. BERNSTEIN: I think that needs some clarification.

MS. FLESKES: I don't know all the history of this site anywhere near as well as you do. What I have been able to find from some of the records, and I wasn't around -- well, I started in the agency in '78, so I wasn't here all the time you're talking about, but that we did try to work with you over a period of time to get a treatment system in place on the discharge. It was the difficulty in getting that in place and finding chromium in the water at FMC wells that caused us to order you to stop the discharge, and to start looking to see what the problems have been caused. I believe you must have appealed that to the board if you say you went before some kind of board or, the Pollution Appeals Hearing Commission.

MR. OTTO NETH: We didn't appeal it, he said you're through, shut it down.

MS. FLESKES: The discharge of that material into the ground water was not a practice that the state could accept under the state laws that we did have to enforce. One of the things you're pointing out is that we tend to address sites in starts and fits having to do with the fact that we've got a lot of activity to carry on, not enough people to do it, priorities do change, and lots of things that I really don't have any control over. It's just a fact of life.

you're not the only one we've addressed it to, do something, and let you alone for a few years, and then say by the way we're back.

MR. OTTO NETH: You're not concerned about a private business. Now, if it costs -- now, we can't afford to keep a business going and do what you asked us to do. You have to fork up a hundred thousand, now, at home you can budget your home, but you don't budget the government's funds, you spend what the government gives you.

MS. FLESKES: Well, that's not true, exactly. We have to request a budget.

MR. OTTO NETH: A couple hundred thousand dollars is a lot of money for a business.

MS. FLESKES: For me, too.

MR. OTTO NETH: Not when it comes to spending government money.

MS. FLESKES: You were asked in 1976 to develop t plans. We didn't say we had enough until 1983, that was 7 years you could have been planning and implementing that solution.

MS. BERNSTEIN: One more question in the back.

MR. NISSEN: I'd like to state --

MS. FLESKES: I may not have all the facts right

MR NISSEN: No, you don't. In that 7-year peri we reduced our discharge over 80 percent. I think we alsc repeatedly stated to the Department of Ecology, we were operating in an extremely competitive marketplace. We would be more than happy to put this system in, but we knew it was going to cost us money to put it in and cost us money to operate it. We asked repeatedly that you address the other shops that we were competing with equally, and if you -- if you can come to us, I think our statement very clearly was, if you can come to us and say we're enforcing this law equally, all the way through, which is equal protection under the law, then we will put a system in, no problem. But we cannot afford -- it's a question of we can go out of business putting a system in and increasing our costs, because if we raise our prices our customers go somewhere else. And I think that was the one thing we stated categorically over anc over again, I know I did at the Department of Ecology, enforce the law equally, that's all I asked you to do. And did not get that.

Now, one thing I think that -- as a matter of fact out of the five or six Hard Chrome shops that are still operating in the Portland/Vancouver area, I would say probably 75 percent of them still don't have a waste treatment system in place.

One thing -- I guess I have a question, when we were listed in Superfund list there were 450, approximately, companies on the original listing. And my understanding was those were listed in order of increasing severity, is that correct, from 1 to 400 or something like that?

MR. WONG: Generally that's true.

MR. NISSEN: There was a ranking. I think Love Canal rated about 85 on that list. And we ranked 54th, if I remember correctly. We were the 54th most hazardous disposal site in the entire country. My question, I guess, if there are 450 some sites on that list, that list came out almost five years ago, has there been a single site cleaned up well enough, I guess -- I could sum my question up, have they issued permits for people to drill drinking water wells at Love Canal. You keep talking about drinking water standards. I want to know if there's a single site that's received a clean enough bill of health that you can tell somebody to drill a well and drink the water?

MR. WONG: I think actually cleanup activities ha been completed, and the EPA has been signed off on 30 something sites.

MS. PAT NETH: That they can drill wells and drin the water?

MR. WONG: The process takes a long time to get through. And in some cases the remedial action may be shut down in terms of the immediate, having to do some sort of construction, in some of these cases there's not a long-te ground water cleanup project going on, in which the ground water may not be clean for some time. But it's in process.

MS. FLESKES: The final construction is complete.

MR. NISSEN: I guess one question, if you've cleaned up 30 sites, buttoned them up and said this is taken ca-e of --

MS. FLESKES: Even if it may be an operational system like the 15 year pump and treat.

MR. NISSEN: Everything that can be done other than monitoring is done, how much money was spent doing that?

MR. WONG: I couldn't tell you. I have no real idea of what kind of money.

MR. BRINCEFIELD: The original funding for Superfund was 1.5 billion dollars, and there's been an additional 9 billion dollars in the new reauthorization, which is, of course, the law we're operating under, it's the law of the land that these 15 people that you're talking about being here doing these meetings, that this gentleman has spoken about, are attempting to enforce to the best of their ability. And we do very much watch your -- I work for the ground water protection agency, and we'll take that into consideration. But it's very important to understand that we ask the same questions that you do. And we have the same concerns. We appreciate what you're saying here, and we need to know where you're coming from, but that a lot of money has been spent. The goal is to protect public health in the environment. We deal with potential situations, not just with actual demonstrated health effects the gentleman is speaking about, but I hope that helps answer your questio

MS. PAT NETH: How much is cleanup and how much is just overhead and salaries?

MR. BRINCEFIELD: I really don't know the answer t that question.

MS. BERNSTEIN: I'll take one last question and that's it, because we have to be out of here.

MR. GILMORE: I hear what you're saying, I kind of agree with some of the things I'm hearing tonight. I think this letter is a gross -- grossly misleading. Here it state the blackberry vines are contaminated, the blackberries are contaminated, the ground soil is contaminated, and there' risk to soils, and all of that you guys contradicted tonight. I want that stated.

MS. BERNSTEIN: I just want to say comments will accepted in written form up until the 19th. I'd like to gi you Ecology's toll-free number is 1-800-458-0920, if you ha more questions, feel free to call. You can ask -- my name Lynn Bernstein or you can ask for Dave Rountry, and then we can refer you to the right technical person or the appropriate person to speak to. If you're not on the maili list and you'd like to be, please sign up out at the registration table, because when the decisions are made it

MR. NISSEN: Would you repeat the toll-free number?

MS. BERNSTEIN: It's 1-800-458-0920. There will be a machine, if somebody is not at the desk, but we will get back to you within a day or two. I need to get your name and phone number for the legal information.

MR. RISER: Are you pointing at me?

MS. BERNSTEIN: Yes.

MS. FLESKES: I think it's appropriate to draw the meeting to a close. We will stay around for a few minutes to talk. Thank you for coming and providing us your comments.

(Hearing concluded.)

CERTIFICATE

STATE OF WASHINGTON)
) ss.
County of Clark)

I, Teresa Rider Foster, a Notary Public for Washington, certify that the hearing re Frontier Hard Chrome here occurred at the time and place set forth in the caption hereof; that at said time and place I reported in Stenotype all testimony adduced and other oral proceedings had in the foregoing matter; that thereafter my notes were reduced to typewriting under my direction; and the foregoing transcript pages 2 to 94 both inclusive, contains a full, true and correct record of all such testimony adduced and oral proceedings had and of the whole thereof.

Witness my hand and notarial seal at Vancouver, Washington, this 12th of November, 1987.

Teresa Rider Foster, RPR
Notary Public for Washington

My commission expires: 2-4-

approximately a year and a half. But there are folks here with Ecology staff who have been working on that site, have a more complete understanding. I would like to refer --

MR. JONES: I'll refer to them and ask them to point out, because we have investigated this, and have found no place where there has been any chromium pollutant beyond the standards of the EPA in this community, and I want to know where you were directing this, where the DOE was directing this.

MR. ROUNTRY: I'd like to refer your question to Mike Gallagher, a hydrogeologist of our team.

MR. JONES: I'd like to hear from Mr. Gallagher.

MR. GALLAGHER: What document do you have in your hand, there, sir?

MR. JONES: I have in hand the information that went in to the federal government. And this is a part of it. It's a part of a National Priorities List site. And some kind of a document was prepared and sent in. And we have information that when it was first released that the people in Washington, D.C. said they weren't going to put this site on the priority, and then they sent in information, and this information stated that drinking water well about three-tenths of a mile from the site, and drinking water for ten thousand Vancouver residents is drawn from the same acquifer.

MR. GALLAGHER: That's correct.

MR. JONES: I want to ask a question about that. How deep are the wells that Vancouver draws the water from

MR. GALLAGHER: I believe approximately 80 feet.

MR. JONES: Have you tested 80 feet at the site?

MR. GALLAGHER: At the site, no. But we've tested --

MR. JONES: Why wouldn't you test at the same depth if you were wanting to be fair about your analysis of the condition?

MR. FREEMAN: Have you read the remedial investigation report, sir?

MR. JONES: I have looked at it.

MR. FREEMAN: I think you'll find that the well- are producing from the same horizons. We do report that in the report. And, you know, what we have found through the course of this investigation is that those wells are what we call upgradient of the contamination. Which is why at this point in time we don't feel that those well fields are threatened. It has nothing to do with their position in the column. It has to do with where they are relative to the ground water gradient.

MR. JONES: Dave, I'm sorry, I don't remember you last name; Dave your first name?

MR. ROUNTRY: That's correct.

don't get any money. If you get in the honey pot again, you can get a lot of money to spend and retire on. It looks like a ridiculous whole thing to start with.

MS. BERNSTEIN: Let me see if I can clarify. You're asking why are people considering cleaning up water to drinking water standards when it might not be used to that reason? Can I turn that over to Mike Gallagher? Mike.

MR. GALLAGHER: It is a drinking water resource, and it is contaminated. And we can't --

MR. WALTER NETH: But the city won't let you put a well there, they won't let you put an industrial well there.

MR. GALLAGHER: I think the state has jurisdiction over that.

MR. WALTER NETH: Whoever has jurisdiction, they will not allow a well there, but you're still talking drinking water standards.

MR. GALLAGHER: That's right, it exceeds drinking water standards.

MR. WALTER NETH: You find a way to spend money and you're going to stay with it until you die.

MR. GALLAGHER: I don't necessarily agree with that.

MR. WALTER NETH: That certainly sounds like what you're trying to do.

MR. GALLAGHER: It's a drinking water resource that belongs to all the people in the State of Washington.

MR. WALTER NETH: The city won't allow you to do that.

MR. GALLAGHER: We have not heard any indication of that.

MR. WALTER NETH: Did you read the reports of the water department put in the paper about what's going on down there?

MR. GALLAGHER: I don't read the Vancouver Columbian. I'd like to see the article.

MR. WALTER NETH: I've got one right here that the Oregonian put out, that tells about how -- we're just loaded with water in Vancouver, all through that drought. Water to burn. They put more wells in the same places which you [illegible] could get contaminated. You're working against each other. But that doesn't make any difference.

MR. FREEMAN: Can I point out something that I think you need to -- there are certain regulatory ramifications of this. We operate in and this study will be conducted under provisions of the Superfund law as revised what are called the SARA Amendments, the Superfund Reauthorization Bill that was -- that came out about a year and a half ago, two years ago now. We apply apply to site cleanup standards when we're doing our feasibility study. look at the realm of potential environmental regulations or make that statement?

MR. FREEMAN: What we said is that blackberry bushes have been shown not to be a very effective bush for sucking up heavy metals. In other words --

MS. PAT NETH: I didn't hear that quote.

MR. FREEMAN: Have you read the document?

MS. PAT NETH: That isn't the way I understood you to say.

MR. FREEMAN: What I said was the Endangerment Assessment showed there was no risk in the blackberries, we're not concerned with the blackberries.

MR. WALTER NETH: You lead everybody to believe that you're going to die if you go near the place. That's the impression you lead everybody. In the fine print you say there's no problems, so why don't you go home and forget it? The dust can be stopped by throwing a layer of blacktop around the building, and it's all through, the project is done, no more 230 some thousand dollars or nothing, plug ther with concrete and go some place where it's important.

MR. FREEMAN: One of the alternatives is the surface only alternative, sir. And you might want to read it.

MR. WALTER NETH: I've read about half of those.

MR. FREEMAN: It's an alternative that's very similar to what you requested we take a look at. It's calle the SO alternative in your document.

MS. PAT NETH: Where do you go from here, after this is done, 50 years from now?

MS. BERNSTEIN: Excuse me, at this point, because we have a time limit on the room, I would like to take more formal comments that -- excuse me for one second, and I'd like to limit the time to four minutes each, and first of all I'd like to start with people who have -- to fill out a card with their name and to raise their hand and Jeanne will collect your cards and I'll call your name. I also would like you to come to the microphone -- if folks would come to the front of the room. Also, I would like to let you know, please summarize in the four minutes that you have, and then anything else that you would like to submit will be -- we'll be taking comments here tonight, written comments and at Ecology until November 19th of this month. So, you have tim to think about things tonight and get in your written comments. But if you'd like to speak now, you folks have four minutes each.

MR. WALTER NETH: Can I say a couple of words whi they're getting these cards?

MS. BERNSTEIN: I'd like to wait and it would be easier for our court reporter to get everything with your name, all in one block. I want to say the address to send the comments is in the fact sheet to Dave Rountry at and there was a well --

MS. PAT NETH: 14.

MR. FREEMAN: Excuse me, 14. And further to the southwest was a well we installed, but that's right amongst the cluster of FMC wells. And the plume is in that area.

MS. PAT NETH: By the same token if they did build there, they wouldn't put wells into service themselves, they would put --

MR. FREEMAN: One of things we've included in they're, and one of the things that the agencies are trying to discuss right now is their ability to apply what they've explained to you is institutional controls to see if it is possible to stop somebody from drilling a well down there. That's a very important fact. That's one of the things they're trying to address right now, can they, in fact, stop people from developing that resource. Certain people would argue, arguments similar to what we've heard about tonight about property rights and water rights and that's one of the problems, here, you know, does someone have the right to tel you you can't drill a well down there if you want to. That' what they're trying to look at, that's one of the reasons there's no decision yet, because that's part of the problem.

MS. PAT NETH: Well, I bought a house out here in Fern Prairie, and it didn't have a well on it. Somehow, the just had a bit well or whatever, and I wanted to get a well.

It almost took an act of Congress to get a well, you know, to put down for a well. So, I don't see -- nobody can drill a well without a permit.

MR. FREEMAN: Mike, you want to address that?

MR. GALLAGHER: My understanding of the regulation is that -- or the law, is that you can install a well and you need a water right permit if you withdraw over five thousand gallons per day.

MS. PAT NETH: I'll put one in, and beat the city out of a two hundred dollar water bill.

MR. GALLAGHER: It might be a city regulation. Yo might want to keep in mind, ma'am, that it might be a city regulation --

MS. PAT NETH: And that's in the city, that's in the city.

MR. GALLAGHER: You may want to put in an irrigation well, and that's not a supply well.

MS. BERNSTEIN: Does anybody else have any questions or comments?

MR. WALTER NETH: What is the object in digging stirring up the back of the barn yard, stirring it up, mak it stink a little more, what is the object in digging it u and moving some place else, which would be in somebody el way. I can't figure it out if you take something up and it away and do something with it.

will be distributed through the mailing list so you'll know.

MR. RISER: That list out in front is your mailing list?

MS. BERNSTEIN: I have a mailing list of about 40 people, but that's --

MR. RISER: I'm obviously not on it, I learned about this meeting word-of-mouth from somebody else. I was kind of surprised I wasn't notified.

MS. LAWSON: You will be then. As long as your writing is legible you'll be on it.

MS. BERNSTEIN: I just want to remind you there will be a decision on the soils source control by December 31st, and then again another one on the water this coming spring.

MS. PAT NETH: How many people are employed on this -- in this study, how many people are -- what's your employment, how many people --

MS. KAPLAN: How many staff people work on it?

MS. PAT NETH: How many people, like starting from the top -- how many people are on your payroll?

MS. FLESKES: How many people are on our payroll?

MS. BERNSTEIN: We have a whole agency.

MS. FLESKES: The Frontier Hard Chrome team is basically the people you see here, Dave Rountry, Mike Gallagher and Megan White. But that's not the only site these people work on. They work on a number of other sites than that.

MS. PAT NETH: How many people are in here that involved in the --

MS. FLESKES: That are involved with the people in some way?

MS. PAT NETH: That get payroll from it?

MS. BERNSTEIN: I'd like to get clear, that we work on other projects, as well.

MS. KAPLAN: Probably just really the team.

MS. FLESKES: That are supported by the site budget.

MS. PAT NETH: Five or ten or 20?

MS. FLESKES: Basically I would say within Ecology we basically have, you know, three people -- well, Lynn, four people that are partially supported by the Frontier Har Chrome budget, and I stress partially supported, probably nc more than 20 to 30 percent supported by that budget in the long run.

MS. BERNSTEIN: Because we have other sites.

MR. GALLAGHER: 20 to 30 percent. That's one and half equivalent people.

MS. PAT NETH: Other in Clark County?

MS. FLESKES: One other Superfund in Clark Count that we've been addressing.